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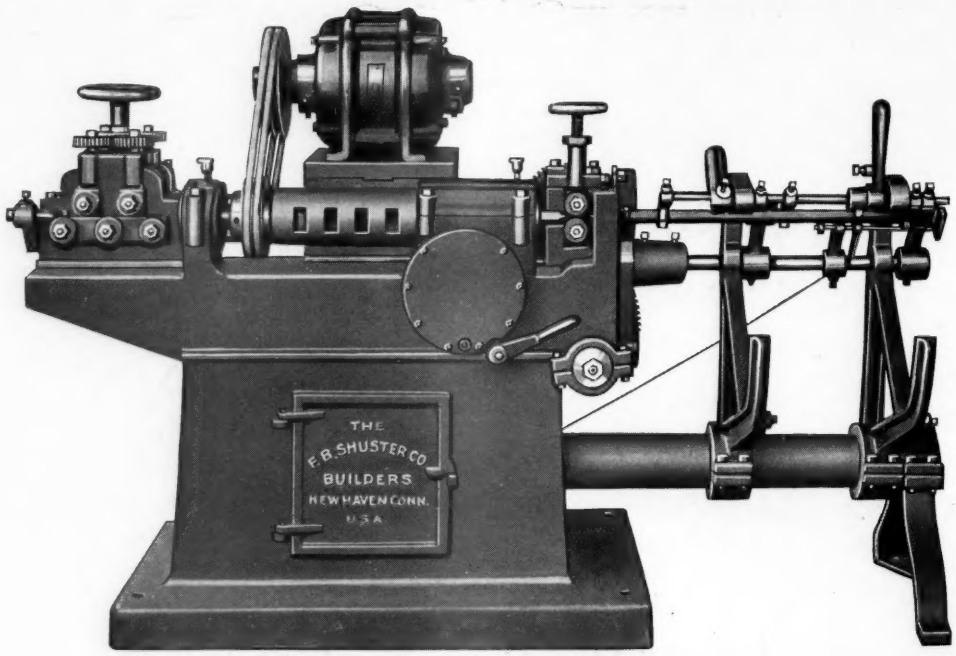

WE are showing this month a self contained motor driven Machine, equipped with a five roll straightener which rough straightens the stock before it enters the rotary head, and which is a valuable addition on some kinds of wire.

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Makes the wire perfectly straight, at high speed, and cuts absolutely accurate lengths day after day for years, with little attention either for operation or maintenance.

Can we tell you more about it?

The F. B. Shuster Co. **New Haven, Conn.**

Formerly John Adt & Son ***STRAIGHTENER SPECIALISTS*** **Established 1866**

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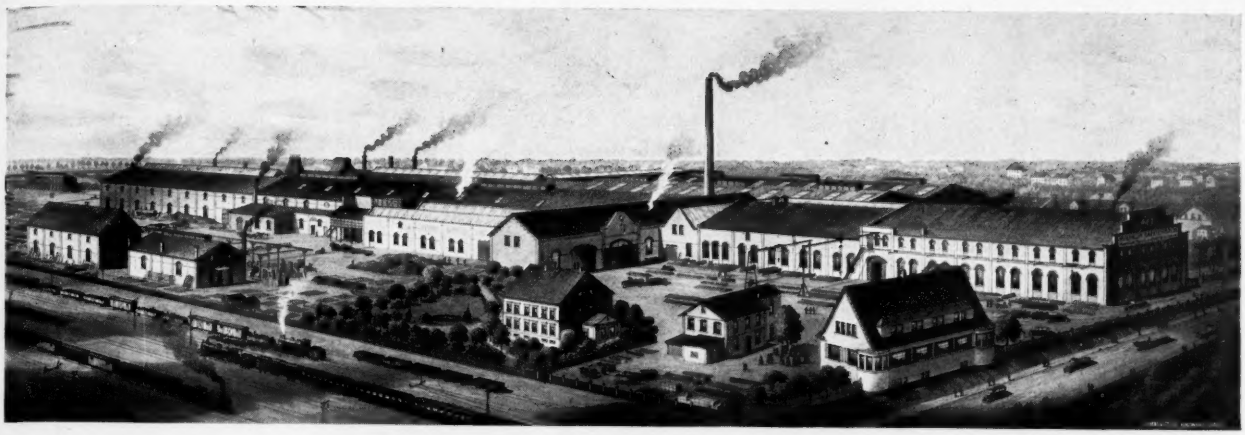

For the first time, the firm of

WILHELM BREITENBACH

(of Unna, Westfalia, Germany)

offers its products to the American wire industry through this advertising medium. The Breitenbach machines have been for decades installed in most of the leading wire factories of Germany and numerous important plants in all other parts of the European continent.

The firm of Wilhelm Breitenbach, established in 1863, has for 60 years been solely occupied with the construction of wire working machines, and it therefore possesses an unusual experience in this line.

A large equipment of special machines and the fact that the machines are constructed from raw material to finished product right in the shop itself, enables us to quote very low prices and, furthermore, the quality of the machines is unsurpassed.

The Various Main Products are the following:

1. **FOR FRICTION, HEAVY AND MEDIUM DRAWING,** of standard as well as special design protected by patent. The special features are the unsurpassed screw spring friction coupling of special design as well as the shaft in ball bearings, patent protected, covered by an oil casing.
2. **FOR FINE DRAWING AND VERY FINE DRAWING** in standard and special designs. The following machines are especially worthy of mention:
   - **a.** For fine drawing and very fine drawing with screw spring friction coupling adapted for special wires.
   - **b.** For fine drawing and very fine drawing with quick disengaging coupling, especially for steel wire.
   - **c.** For very fine drawing with attached winding device, especially for wire rope.
3. **MULTIPLE DRAWING MACHINES** designed especially for iron wire from 2.2 mm up (patented design). Drawing rollers and drawing stones are entirely cooled in the drawing liquid during operation. For iron wire from 2.2 down to 0.8 mm, the output of 1000 kilos per laborer in 8 hours is unexcelled.
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The American wire industry also needs these machines, because they are highly developed in every respect.

Expert representatives who are in close relations with the American wire industry are wanted.

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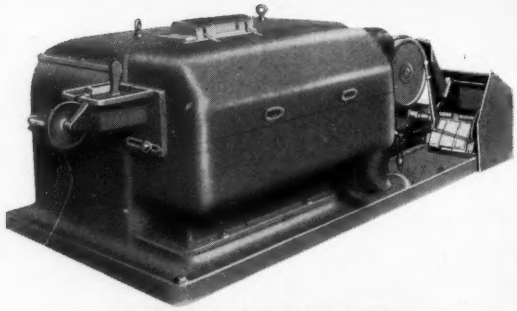
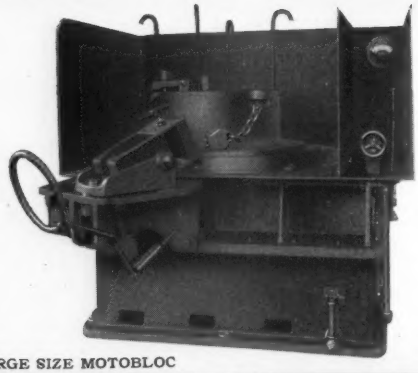
Vaughn Motoblocs have revolutionized the old standards of wire mill production as every Motobloc is a self-contained electrically controlled machine combining the utmost in speed, flexibility, slow starting and safety that insures better wire production at lower cost.



No. 1 VAUGHN CONTINUOUS WIRE DRAWING MACHINE



LARGE SIZE MOTOBLOC

The Vaughn Copper Wire Drawing Machines because of their extreme compactness and high production are rapidly being recognized as the outstanding development in the art of copper wire drawing.

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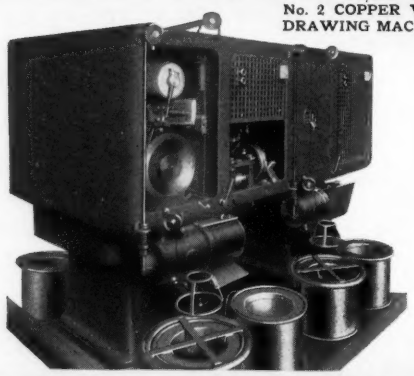
These machines are manufactured under a license from the Western Electric Company, Inc., by which certain exclusive rights have been acquired.

Vaughn Wire Drawing Equipment includes a complete line of Motoblocs for drawing anything between No. 20 Guage and 1″ diameter, single hole; a complete line of Continuous Copper Wire Drawing Machines as well as a line of galvanizing, patenting and heat treating equipment for every requirement.



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VAUGHN MACHINERY CO.,
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EXPORT OFFICE: 420 LEXINGTON AVE., NEW YORK, N.Y.

NO publication that we know of represents quite the same interelation of the interests of reader, advertiser and contributor as **Wire & Wire Products.** Some subscribers are well and favorably known to us in all three capacities.

This close association of common interests will excuse our thus bringing out into the light our complaint against inertia on the part of our otherwise highly regarded well-wishers.

The pace of our plans for strengthening and expanding the editorial program must of necessity be adapted to the supply of acceptable material. In some respects it is coming along nicely and in abundance, but to maintain the variety that so broad a field demands requires more well-informed wire men willing to take pen in hand occasionally to tell the rest of us something about their methods or their problems.

We are endeavoring to smoke out the authoritative sources of supply for a number of articles. Speedier progress would follow our efforts if potential contributors would meet us half way—even with nothing more than suggestions. Our greatest difficulty is in stirring to action the man who knows his wire and is willing to talk about his specific knowledge but who procrastinates when it comes to setting his words on paper.

What interests us most just now is the fact story of actual experience in wire production or fabrication where the problem met and solved is one of manufacturing, research, management, marketing, or any of the other divisions of responsibility that engage the attention of industrial executives.

Such articles will appear in these pages from time to time with increasing frequency and a most hospitable reception is promised to contributors of suggestions that will lead to more.

The Publishers.

WIRE & WIRE PRODUCTS

A monthly publication devoted to wire drawing and wire forming

Vol. 3 **October, 1928** **No. 10**

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Krupp-Made Widia Metal and Wallramite Used Exclusively in These Dies

The fact remains that the European competitor is able to undersell the American Wire Manufacturer, in spite of heavy duty and transportation charges.

What Made it Possible?

The following will throw some light on the subject:

1. Die cost is reduced to a minimum with UN-WIDIA and WALLRAMITE dies, which have replaced the chilled iron, steel and in the case of hard wire, diamond dies.
2. Production per machine is increased from 25% to 35% due to increased drawing speed and continuous drawing with UN-WIDIA and WALLRAMITE dies.
3. Quality of the wire is much finer at a decreased cost.
4. With better quality of wire from the coarse wire machine, the diamond dies last twice as long on size when redrawing on fine wire.
5. Labor is reduced in direct proportion to machine production.
6. Die room cost is cut 75% and more.
7. Many of the usual cleaning operations are eliminated by the use of UN-WIDIA and WALLRAMITE dies.

UN-WIDIA AND WALLRAMITE DIES ARE MANUFACTURED AND SOLD EXCLUSIVELY BY THE

UNION WIRE DIE CORP.

Manufacturers of diamond and alloy metal dies

250 WEST 40 STREET NEW YORK CITY

WIRE & WIRE PRODUCTS

Vol. 3 OCTOBER, 1928 No. 10

Imported Alloys Replace Chilled Iron In Drawing Dies

New Krupp metals of diamond-like hardness require no reaming and draw uniformly round wire

By M. Simons

President, Union Wire Die Corporation

IN the past twenty years, some of the ablest metallurgists in the world have been trying to solve the problem of finding a metal that would take the place of a diamond. Particularly, they were interested in finding a metal that could take the place of a diamond, where a diamond could not be used, due to size. In dressing emery wheels in regular machine shop production, a smaller diamond could be used for dressing a bigger emery wheel, but in the line of wire drawing, where a diamond die is used very efficiently on fine sizes, it could not be used on drawing down from the size of the rod on account of two reasons. The first is that a diamond big enough to take in a '250" hole, would be much too expensive, if found solid enough. In the second place, diamonds of that size are very rarely found to be solid. Therefore, chilled iron dies were being used from the rod size down to .081 and sometimes to .072. From that size down, it was drawn on diamond dies.

The chilled iron die, of course, was reamed to shape and size by an ordinary reamer and therefore it was actually impossible to get the size of the wire the same, as well as round. In the first place, the chilled iron die was good enough only for one to three coils of wire, which amounted to 250 or 750 lbs., of wire and even in that instance, each coil usually measured about .0005 smaller at one end than on the other. In other words, the die was wearing too rapidly. Secondly, the die being reamed by a reamer, could never be absolutely round. While the chilled iron die was costing but a few cents, the steady cost of reaming out the dies, forced each mill to actually keep a staff of men at a big cost for this work. These dies were used until they would draw up to the highest size, when they would be totally discarded. Another and very important factor to be considered, was the fact that due to the rapid increase of size of the dies in the machines, it was necessary to string up each coil separately, which meant a decrease of 20% in the production of wire in the machine.

All of these were problems, but a metal that would be hard enough, tough enough and yet not easily break, was not so easy to find. As a matter of fact, after working for sixteen years continuously, they finally succeeded in Germany, in producing a metal which was hard enough, in fact anywhere from 93 to 98% of the hardness of diamond, but it was too brittle and on that account, was not very successful in the drawing of wire. Two more years of development work in the laboratories of the Krupp Co., of Essen, Germany, in conjunction with the inventors, has finally produced a metal which is now being very successfully used in the drawing of any sort of alloy wires, soft wires and all kinds of steels. As a matter of fact, today 95% of the wire drawing mills in Europe are using these dies for drawing down from rod to .064 and in cases of steel, to much smaller sizes. Wire produced is of uniform size and round, just as if drawn on diamond dies. In wet drawing

(*Please turn to page 353*)

The New Magnetic Tests of Wire

Development of instruments operating on the principle of magnetic analysis points to unlimited possibilities in detecting flaws

By J. D. Brunton

Brunton's Research Laboratory, Musselburgh, Scotland

A MEANS of testing steel wire for all defects in composition and drawing, and for testing it at high speed, with automatic shut-offs, promises so much to the industry that this conservative description of equipment already perfected will be welcome. In the next article in his series Mr. Brunton will discuss useful chemical tests, more particularly those requiring little or no laboratory equipment for seeing imperfections.

A method of testing wire which promises a great future is one which at present is almost in the experimental stage and depends on one particular property of the metal wire.

All classes of steel have a certain susceptibility to magnetism and for any one condition of structure the susceptibility is constant. When a steel wire is magnetised by an electric current there are two fundamental quantities involved. The magnetic condition of the wire itself and of the region surrounding it is usually defined in terms of the "total magnetic flux", which may be pictured as closed curves extended through the wire or a portion of it with the return portions of the curve in the surrounding air.

Measuring Magnetic Force

The cause of this magnetic flux is usually an electric current flowing through the winding of a wire helix surrounding the wire and is called the magneto-motive force. Since the total magnetic flux is proportional to the cross-section of the specimen and the magneto-motive force for a given flux depends upon the length of the specimen, it is necessary to introduce two related quantities before the magnetic properties of the wire can be defined. The induction is the magnetic flux per square centimetre of cross-section. The magneto-motive force of a long solenoid divided by the length of the solenoid in centrimetres is called a magnetising force. Both the induction and the magnetising force are measured in a unit called the "Gauss."

If the steel wire is magnetised by a gradually increasing magnetising force the induction increases, but not at the same rate as the magnetising force. After a certain state of magnetisation has been produced and the magnetising force is then decreased the induction is decreased, but in such a manner

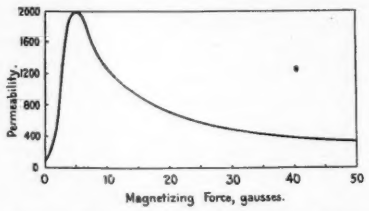


Fig. 1—Both the induction and the magnetizing force are measured in a unit called the Gauss. The curve of permeability plotted against magnetizing force shows the characteristics of the permeability.

that it has a greater value than it had upon correspondingly increasing magnetising forces. If the steel wire is submitted to a cyclic change in magnetising force between two equal and oppositely directed values the sets of corresponding values of induction and magnetising forces show that there is a certain reluctance on the part of the wire to part with its induced magnetism. This reluctance on the part of the steel wire to give up its induced magnetism is called its permeability and is the ratio between the magnetic induction and the magnetising force. This ratio is designated by the Greek letter Mu. The curve of permeability plotted against magnetising force, as represented in Fig. 1, shows the characteristics of the permeability. The permeability is not zero when the magnetising force is zero but has a definite value which is called the initial permeability.

The Underlying Principle

The science of magnetic analysis consists of the systematic correlation of the magnetic and other properties of materials and of the application of the laws and principles which underlie the inter-relations of such properties, particularly the inter-relations of the magnetic and mechanical properties of

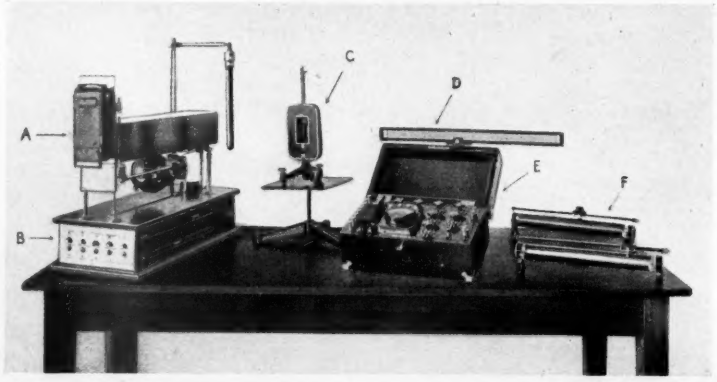


Fig. 2—Complete recording and control set, showing: (A) Camera box with single filament lamp. (B) Defectoscope control box. (C) Galvanometer. (D) Translucent scale. (E) Magnetoscope control box. (F) Rheostats.

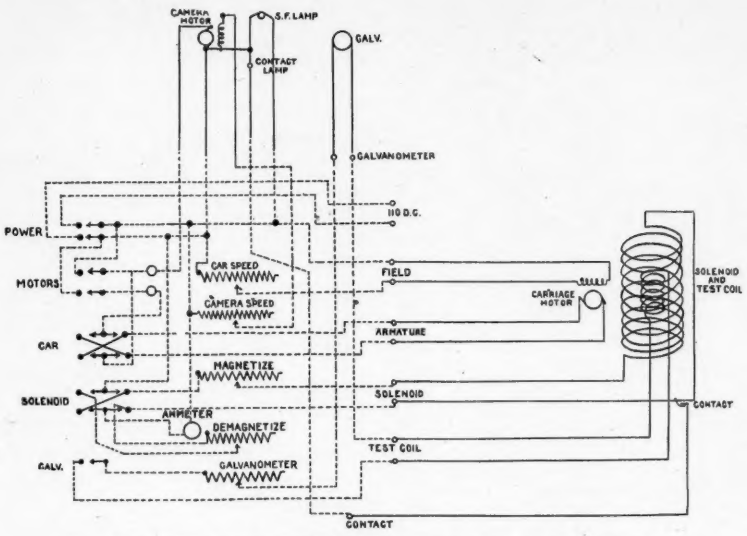


Fig. 3—Diagram showing complete electrical connections of the defectoscope.

steel. It is based upon the fact that there is one and only one set of mechanical characteristics corresponding to a given set of magnetic characteristics.

There are two distinct phases of magnetic analysis. In one the average nature of the specimen under test is determined quantitatively and for this an instrument called the magnetoscope is used. A second and equally important phase lies in the survey of various portions of a more or less extensive specimen, such as a coil of wire. This instrument is called a defectoscope.

Two Types of Instruments

The magnetoscope gives information about the composition and mechanical and heat treatments of the specimen, but does not in general give any indication of the existence of flaws.

The defectoscope determines whether there is any lack of uniformity in the specimen, but does not indicate whether the specimen is as a whole hard or soft.

In most cases the information given by one of the instruments is sufficient. However, if the full nature of the specimen must be determined both forms of test must be carried out and the equipment for this purpose is called a magnetic-analyser.

A magnetic-analyser, devised by Dr. Burrows and manufactured by Holtz & Co., of New York, is shown in Fig 2. It consists of five essential units.

(1) The Solenoid element consisting of the magnetising Solenoid, test coil, driving motor and contact mechanism.

(2) The camera box, to which is attached the camera motor, a

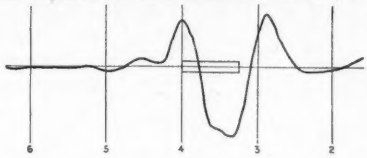


Fig. 4—The record on the photographic film will be a curve intersected by straight lines at regular intervals. Irregularities in this curve are caused by deflections of the galvanometer and locate inhomogeneities in the test specimen as well as the approximate magnitude of the flaw.

film carrying mechanism driven by this motor, a single filament lamp and a contact lamp, the latter inside of the box itself.

(3) The Defectoscope Control Box, containing switches, rheostats for the various circuits and ammeter for the magnetising circuit.

(4) The Galvanometer.

(5) The Magnetoscope Control Box.

(1) The magnetising solenoid is wound with well insulated copper wire on a brass tube, the size of which depends upon the size of the material to be tested. Inside of this is the test coil unit, consisting of two coils of fine wire having an equal number of turns and so connected that their ballistic effects are opposed. These are wound on a brass tube, the cross-section of which approximates the cross-section of the test piece, and which is sufficiently large for the specimen to pass through without binding. The hole is solidly mounted on rigid brass castings and, by means of a motor, is either moved over the specimen or moves the material to be tested through the solenoid at a uniform rate of speed.

The Contact Mechanism

A contact making mechanism can be so connected as to finish the contact lamp inside the camera box for any given distance of travel.

(2) The camera box carries at its rear end the film carrying device which is simply the case of a folding autographic camera. This is driven by means of a small motor, mounted under the box, so that it moves downwards over a narrow slit through which the light of a single filament lamp, also mounted on the camera box, is reflected from the galvanometer mirror. This produces on the film a record of the motion of the galvanometer coil. The contact lamp records cross lines on the film, thus locating features of the photographic record at their exact position along the specimen. On the bottom of the camera box is set a small translucent scale the same width as the film, the purpose of which is to observe and control in advance the maximum defection of the galvanometer

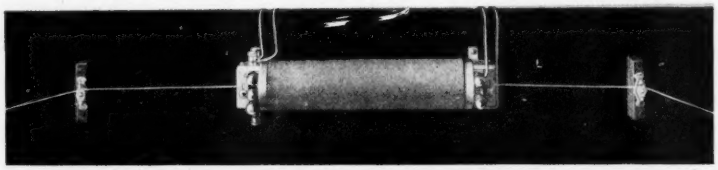


Fig. 5—Wire testing solenoid mounted for inspection in process.

mirror. This device may be also used for visual inspection.

A description of the Defectoscope Control Box necessitates a discussion of the electrical connections. The diagram of connections is shown in Fig. 3 and it will be noticed that there are five separate rheostats, two with reversing switches. These control the current going to the solenoid, test coil and motors.

Employs D. C. Current

Commercial 110 volts D. C. is the only source of current necessary. The leads from the commercial main enter the box at the binding screws marked "110 D. C." and should be externally used with a 15 amp fuse.

(4) The galvanometer is a d'Arsonval instrument of the narrow coil type. It is furnished with a permanent shunt cutting down the normal deflections to a range slightly greater than the width of the film when the galvanometer and camera box are in proper position to focus the image sharply. Further adjustment is obtained by means of the variable resistance marked "Galvanometer" contained in the control box. Fig. 4 shows a record taken on the photographic film of the irregularities of a specimen under test.

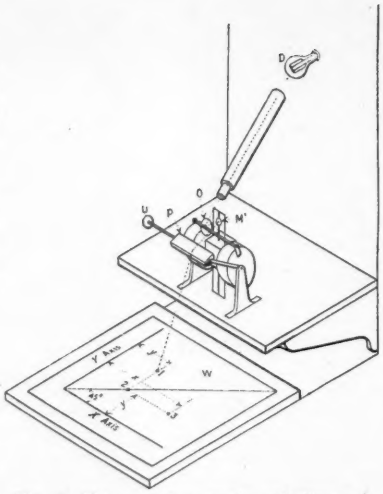


Fig. 7—The use of a single reflecting galvanometer, which permits reading from a spot of light, offers many practical advantages. The position of the spot of light is recorded on the plotting paper at W.

To determine the magnetic properties of the specimen quantitatively the magnetoscope control box and the translucent scale are required.

(5) The magnetoscope control box embodies in convenient form all the equipment necessary for the control of static quantitative tests. This includes a mutual induction coil of known value for calibration purposes, a magnetising and demagnetising switch, a triple range ammeter with the necessary shunts, the necessary series of resistances, and a galvanometer key.

The magnetic analysis of wire is carried out by means of a fixed solenoid on a solid brass base, on the end of which is placed a small motor. This motor may be connected to a drum which pulls the wire through the solenoid at a uniform rate.

It may be convenient to inspect the wire during the process of manufacture, in which case the solenoid may be set in any convenient place in the process where the wire is wound, using this as a source of motion. Fig. 5 shows a wire solenoid so arranged.

In the manufacture of high tensile steel wire it is advisable to test in the heat-treated condition, as hard spots are frequently left in the material which causes early failure of the material in subsequent drawing.

As high as 200 feet per minute can be inspected by a single solenoid and, to avoid delay in the testing of a large quantity of wire, visual inspection may be resorted to. Any portions of the material that cause marked deflection of the galvanometer can be discarded and used for further inspection, both mechanically and micrographically.

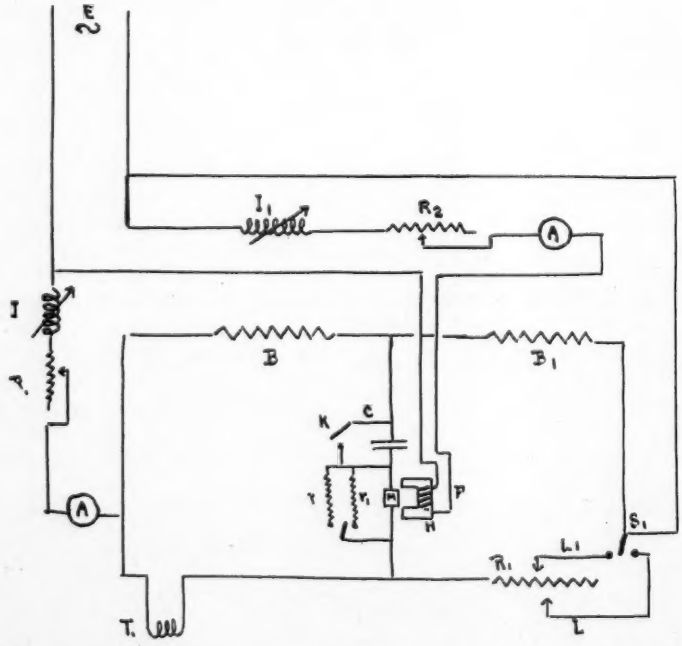


Fig. 6—Diagram of a form of apparatus employing the de Forest method of magnetic testing by comparing a manifestly bad sample with a good one that has received the same treatment.

The de Forest Method

Another method of magnetic analysis which is in a way an improvement on that of Fay & Burrows, is one devised by A. V. de Forest, Research Engineer of the American Chain Co., Bridgeport, Conn.

De Forest's method consists of comparing, say a manifestly bad sample with one which has received the same treatment and is yet good. In this way by eliminating variables the magnetic characteristics of one variable may be observed under different conditions which may be correlated with mechanical properties. In Fig. 6 is the diagram of one form of apparatus employed.

From this diagram it will be seen that the test coil forms one arm of a bridge circuit which is energised from a source of variable E. M. F. through a variable inductance (I) and variable resistance (R). Ratio coils (B, B_1) are shunted across the solenoid and sliding resistance (R_1) in series with the solenoid. Bridging this circuit is the moving coil of an A. C. galvanometer. In series with the moving coil is a condenser which may be short circuited by a switch, and bridged across the terminals of the instrument are two resistances which permit of adjusting the sensitivity of a galvanometer under two conditions. The field winding of the galvanometer is excited through the variable inductance (I_1) and resistance (R_2). All switches are operated from one handle and simultaneously close the switches for the two different circuits, i. e., with and without the condenser.

Manipulation of Apparatus

In the use of the apparatus shown in Fig. 6, a standard specimen of known heat treatment is inserted within the solenoid T and switch S_1 closed so as to connect with slider L. Key K is now closed so that condenser C is short-circuited. Switch S is closed and the currents in the test solenoid and galvanometer field circuits adjusted to desired values by means of resistances R and R_2. The deflection of the galvanometer G, which is normally observed, may be brought to any desired value on the scale by combined manipulation of slider L and resistance R.

The final value as adjusted may be defined for the present as the X reading. Switch S_1 is now closed so as to connect with slider L_1, key K is opened so as to place C in series with M and the galvanometer deflection brought to its desired value by the combined manipulation of slider L_1 and resistance R_1. This second galvanometer deflection is designated as the Y reading. These two galvanometer deflections are indicative of different combinations of two different magnetic properties of the standard specimen and subsequent readings with test specimens are to be referred to these values as standard.

The use of condenser C, as when placed in series with M or short-circuited, operates to cause a variation in phase relation between the current in the moving coil circuit and that in the galvanometer exciting field. This variation in phase relation and the modification in wave form which accompanies it, allows a desired discrimination between two different magnetic properties, and hence structural properties, of the material in T.

The use of a single reflecting galvanometer, which permits reading from a spot of light, offers many practical advantages and in Fig. 7 is shown an arrangement that has been found very useful. D is a light source which is deflected by the mirror O to the galvanometer mirror M and thence, by means of the mirror P, to the coordinate paper W. P may be rotated by hand about its horizontal axis, by means of the knob U, so as to adjust the light spot along the Y axis of the coordinate paper. If then the circuit be closed, with the condenser in, that is to say, in obtaining the Y reading, a deflection is observed indicating the condition of balance in the circuit under these conditions.

The position of the spot of light may be at 1 on the plotting paper in Fig. 7. This measures a distance y which, however, being traced paralled to the X axis, is in the wrong direction for measuring the Y coordinate. By the simple device of moving by hand the mirror P, the spot of light is made to travel parallel to the Y axis from 1 to 2, the position at which it intersects the 45-deg. line bisecting the angle formed by the X-Y axes. The distance from 2 to the X axis is now equal to y, measured as is necessary along the Y axis.

Without moving the mirror P, the X circuit is then connect-

(*Please turn to page 354*)

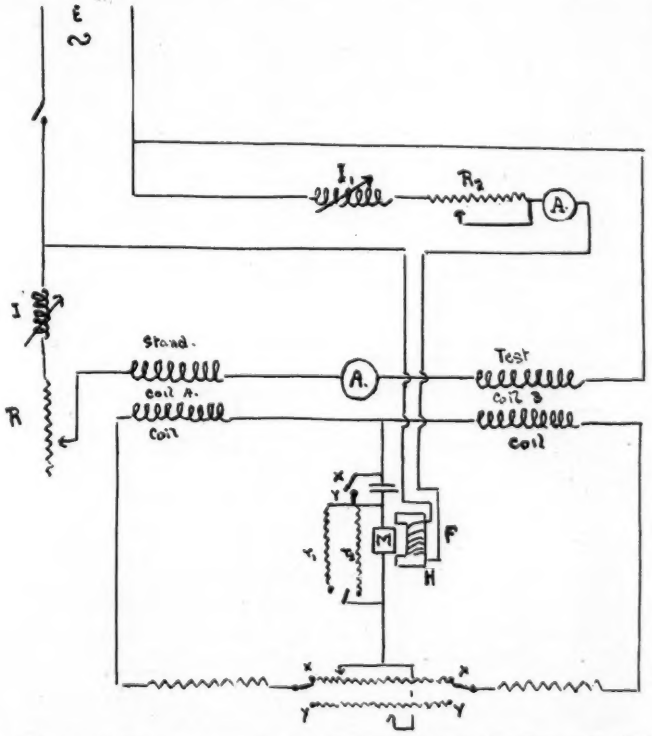


Fig. 8—This circuit differs from the other one illustrated in that the galvanometer bridge circuit is a secondary circuit. The two test coil windings are identical, and a standard or good sample is placed in one. The other test coil receives suspected samples or a coil of wire may be drawn through at a uniform rate.

Standard Tools for Gauging and Measuring Wire

Stock models serve most purposes and a great variety of special instruments is available for others

Illustrations, except when otherwise noted, are by courtesy of Brown & Sharpe

Fig. 1—Micrometer Caliper. For measuring when actual wire size, not gauge, is required. For measurements finer than one thousandth of an inch vernier graduations are provided.

THOSE who have occasion to keep well informed about the subject may find little that is new or novel about the wire gauging devices here discussed. The practical application of the article is directed to the reader who is working with inferior tools when better models are suited to his particular needs. There are types for all uses.

IN considering the many types of tools for measuring and gauging wire we find two rather distinct classifications. One is the standard type of tool which is carried in stock by supply dealers, while the other is strictly a special tool made up for some particular measuring requirements. Very often the latter type incorporates a standard tool as a part of the complete unit.

It is the intention of this short article to deal only with the standard types of measuring and gauging tools which can be divided into two general classes. The first class includes tools which give the actual measurement of the wire without respect to variation from any particular gauge size. The other class includes the several varieties of tools known as gauges which do not have means of adjustment to enable the actual variation from the true gauge size to be determined.

Fig. 2—A Micrometer Caliper equipped with a handle to protect the hand against heat. It is also provided with a large ring clamp screw for use in gauging.

The Micrometer Caliper (Fig. 1) is undoubtedly the most commonly used tool for measuring wire where the actual wire size and not the nearest gauge size is required to be known. Many prefer the one-half inch size, because of its handiness for carrying in the pocket, although the one-inch size is in more common use. For certain work the clamp ring for clamping the micrometer spindle is very desirable, and both the one-half inch and one-inch sizes can be obtained with or without clamp ring if desired.

For measurements finer than one thousandths of an inch the "ten thousandths" micrometer is used a great deal, the readings to ten thousandths being obtained by vernier graduations on the hub, as shown in Fig. 1. The one-half size of micrometer can also be obtained graduated to read to one ten-thousandth.

A Hot Wire Gauge

For certain work requiring measuring of hot wire the micrometer of the type shown in Fig. 2 is very useful, in that it has a wooden handle to protect the hand from the heat of the wire. It is also provided with a large ring clamp screw for handy clamping of the spindle when it is desired to use the tool for gauging.

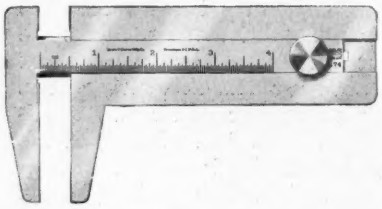


Fig. 3—A caliper gauge made for hot mill work, stock room and storage use is of heavy construction to withstand hard usage.

For Fine Jewelry Wire

Another type of micrometer which is very useful for fine measurements on the smaller sizes (Fig. 9) is especially suited for gauging fine wire such as filament wire or wire used in jewelry work. This micrometer is designed especially for easy reading to ten thousandths of

Fig. 4—Round gauges of this design are probably the most commonly used. Tools of this type are made for gauging drill rod as well as both steel and non-ferrous wires.

an inch as the ten thousandths graduations are spaced about the same distance on the hub as the one thousandths graduations are spaced on an ordinary micrometer. This feature is particularly useful for the rapid checking of wire sizes requiring fine measurements.

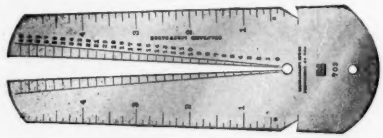


Fig. 5—A large screw and wire gauge for shop use, with convenient graduations based on both old and new standards.

Another caliper, especially suited for hot mill work, is the Rolling Mill Gauge shown in Fig. 3. This caliper is of heavy construction to withstand hard usage. The graduations on the tongue are in thirty-seconds of an inch, making the tool very useful for measuring fractional sizes of wire. A similar gauge for stock-room and store-room use is graduated in thirty-seconds of an inch. The gauge sizes are the English or Birmingham Standard Wire Gauge Sizes from No. 1 to No. 32.

The Common Round Gauge

Several gauges of design similar to that shown in Fig. 4 are of the type in common use for wire gauging. Fig. 4 is American Standard Wire Gauge such as is used for gauging non-ferrous wire to the standard adopted by the brass manufacturers.

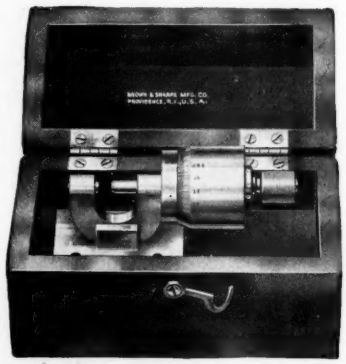


Fig. 9—A micrometer designed especially for use in gauging fine wire such as filaments and wire used in jewelry work is adjusted for easy reading to ten thousandths of an inch.

A gauge much like it in design is the English Standard Wire Gauge for gauging iron wire to English or Birmingham Gauge or, as it is commonly known, to the Stubs Soft Wire Size. Another gauge not illustrated, which in appearance is like Fig. 4, is commonly used for drill rod and commercial steel wire for general use, such as telegraph wire, baling wire, etc. It is called the Washburn and Moen Standard Wire Gauge. In addition to the above standard gauges the Steel Music Wire Gauge, commonly known as the American Steel and Wire Company Standard, for use in gauging so-called Music Wire, is made in a design like Fig. 4.

A handy gauge for wire from 1/16″ to 7/16″ is a Pocket Screw and Wire Gauge in the form of a pierced flat steel strip, not illustrated, but resembling Fig. 6, one side being graduated to the

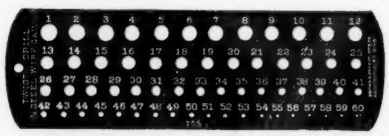


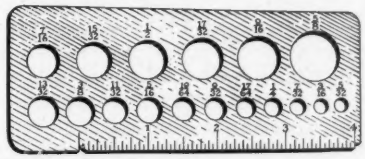
Fig. 6—A twist drill and wire gauge is most useful in the stock room for selecting steel rods of given size. One model takes Nos. 1 to 60, and a smaller one Nos. 61 to 80.

old or English Wire Gauge and the other side to the new or American Wire Gauge. The small size makes the gauge very convenient for carrying in the pocket.

Shop and Special Tools

For shop use the large Screw and Wire Gauge shown in Fig. 5 is very convenient, being graduated to the old and new standards. Another type of gauge which is found very useful for selecting steel drill rods, especially in the stock-room, is the Twist Drill and Wire Gauge, shown in Fig. 6. There is a large size gauge for numbers from 1 to 60, and a smaller gauge for numbers from 61 to 80. A similar type of gauge known as a Jobbers' Drill Gauge, for selecting drill rods from 1/16″ to 1/2″ is found very useful, both the fractional and decimal sizes being stamped on one side.

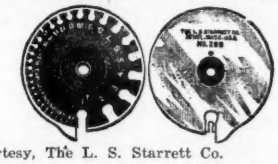
The gauge illustrated in Fig. 7 is designated for measuring nail heads. It has a four inch rule scale on the edge of the gauge and covers a range of sizes from 5/8″ to 5/32″, but can be made to order in other ranges of sizes.



Courtesy, A. Waldeck & Co.

Fig. 7—A nail head gauge, actual length five inches, covers a range of sizes from 5/8 to 5/32 and has a four-inch rule scale on the lower edge.

The device illustrated in Fig. 8 is a wire gauge guide for use with gauges of the type illustrated in Fig. 4 and is designed to save time and eliminate mistakes when gauging duplicate work. The gauge is held on the central stud and may be located in position so that all but the required number will be covered.



Courtesy, The L. S. Starrett Co.

Fig. 8—A wire gauge guide is for use in handling duplicate work. It may be locked in any position so as to leave only the required number exposed.

No attempt has been made here to describe the special gauges for special uses such as are made by most manufacturers of the standard types of instrument. One gauge, for instance, is a folding instrument in appearance resembling Fig. 5 but less than five inches in length. It comprises two pieces, fastened by a pin at the base. One leaf covers a range of wire sizes from 10 to 20, with decimal equivalents corresponding to each wire size. The other leaf is marked in fractions from 5/16 to 1/32. It is especially designed for the convenience of salesmen and other travelers who require a pocket tool.

In selecting gauges, the essentials are hardness, readable markings and accurate standards. In ordering them the purchaser should specify the style, the standard used, and the composition and sizes of the wire to be measured.

Hardening Springs for Elasticity

Some data on endurance that run counter to prevalent beliefs may explain some causes of spring failure

A spring obviously depends for its action upon the elasticity of the material of which it is made. All metals and many materials have a certain amount of this property, but metals which have been prepared for spring service have their elasticity developed as high as possible. High elasticity in a metal can only be produced in one way, by the increase of its hardness. It does not matter how this hardness is developed, whether by cold working of suitable metals or by heat treatment of steel.

Any of the metals that can be thus cold worked to an considerable degree, or the steels that can be tempered, will make an excellent spring, provided there is a certain amount of permanent set allowed before rupture will occur under test to destruction and the elastic limit is not exceeded in service. The hardness does not materially influence the modulus of elasticity or rate of deflection under stress, but does control the number of degrees of flexture or latitude of elastic motion. The modulus of elasticity is influenced, however, by the chemical nature of the metal.

The Modulus of Elasticity

Steel appears to have about the same modulus of elasticity independent of any condition or hardness it may have, while the non-ferrous alloys and cast irons, obeying roughly the same law, have it decidedly different from that of the steel group. The latter is stiffer.

MUCH of the most significant research in the direction of spring manufacture and performance has been conducted privately by individual manufacturers and is not readily available to the reader of the limited trade and technical literature on the subject. For the accompanying contribution we are indebted to The Shore Instrument & Manufacturing Co. for permission to reprint a section from their book describing the use of the Scleroscope, their machine for testing the hardness of metals.

If thus a steel bar were to deflect 1" for each 100 lbs. of load, a bar of the non-ferrous alloys and cast iron would deflect about 2" under the same load. If all stresses imposed are well within the elastic limit, metal springs will endure for hundreds of millions of deflections, and under the proper conditions perhaps are indestructible. This data is contrary to the general prevalent beliefs, but the latter can be shown to be, for the most part, fallacious, particularly on the ground that most of the spring failures of the past have been due in the outset to improper heat treatment of the steels used, or the improper hardness and toughness in brass, bronze and German silver, etc., so that in any of the cases cited, the overload was at one time or another great enough to exceed the elastic limit and therefore also to cause permanent set.

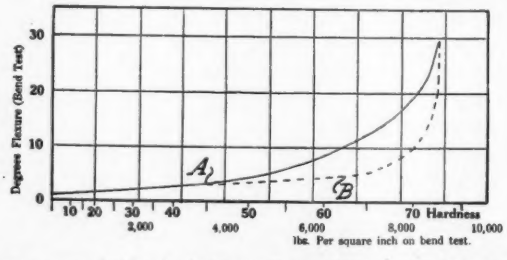


Fig. 1—Bend stress curves showing in the full line a low elastic limit and high ultimate strength due to uneven hardening such as is usually found in quenching steel not capable of hardening deep, the core remaining comparatively soft. The dotted line shows the normal elastic limit such as is to be expected when the hardness is uniform all through.

It requires only a limited number of repetitions of stresses beyond the elastic limit to cause disintegration and breakage of any known metal or material.

The Science of Spring Making

In springs of tempered steel having a thickness of cross-section of more than ¼", special alloy steels are recommended at the present time. The reason of this is quite obvious.

In carbon steels, a hardness of more than ⅛" deep is rarely obtained, assuming that the steel had been carefully cleaned before hardening, while with commercial scale on, together with a certain amount of decarbonization, there will be little or no hardening at all. The result of such delusive practice is inevitable sagging and final breakage of the springs so made. See Fig. 1.

The first requisite must necessarily, therefore, be hardening all through no matter what the size. Only steels supersensitive to heat treatment will thus harden deep. Hence chromium and, sometimes, nickel is added to impart super-sensitiveness and to refine the grain, although more frequently vanadium is also added, imparting toughness in addition to the highest elasticity. Chrome-vanadium steel or any other alloy, when stressed beyond its elastic limit, will sag and break like any other metal, but owing to the toughening quality imparted by the vanadium, such total failure will be longer delayed. Supersensitive steels often harden, not only through scale, but also in oil.

Heat Treatment

Before working up and hardening steel intended for springs it is necessary for the inspectors of raw material to determine, (1) will the hardening be high enough? (2) will such hardness

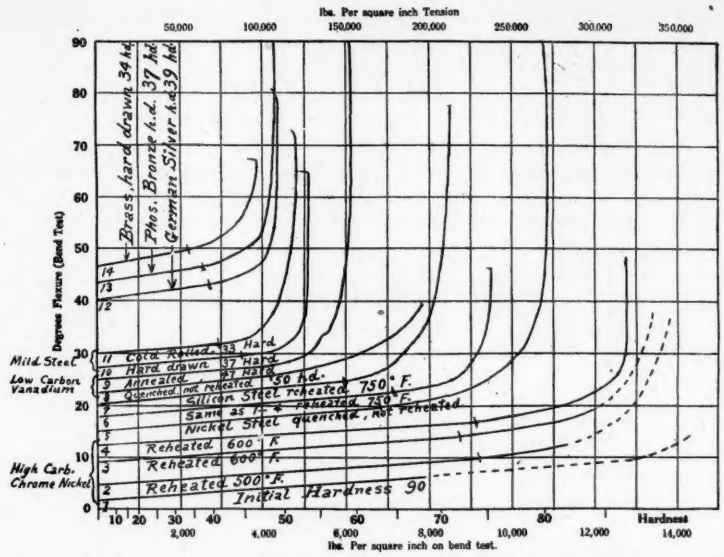


Fig. 2—Samples of some elastic limits that may be expected in the materials designated. The hardness given under the chart approximately represents the hardness of each specimen at the elastic limit cross-marked.

be deep enough? The latter can only be determined by breaking and the observation of the fracture by or after tempering, making a bend test to show that the elastic limit compares favorably with the values given in the chart (Fig. 2) at a given hardness.

In heating, preparatory to quenching, the critical point should be determined by the use of a magnetic balance or recording pyrometer and only enough super-heat should be used to harden small pieces all through.

In larger cross-sections, especially when the mill scale has not been fully removed, enough super-heat must be employed for depth of hardening to often endanger the steel. The hardness test will, in the higher carbons, indicate crystallization by a falling off in the values comparative to samples given less super-heat.

In special alloy steels, it is not impossible to harden clear through sections more than two inches in diameter. See Fig. 3.

Tempering and Inspection

In some low carbon alloy steels only partial (sorbitic) but yet deep hardness may be obtained. In these instances no reheating or tempering may really be necessary. The objection to such steel is (1) an abnormally low and uncertain elastic limit even though the ultimate strength may be high, (2) the tendency to brittle hard corners.

The most reliable practice would, for a number of reasons, be based on the use of such steels as will harden high enough to guarantee a considerable letting down of temper by reheating. The heat should never be less than about 600 deg. Fahr., or more than 800 deg. Fahr., according to the hardness that is to be retained with the accompanying elastic limit.

The Correct Hardness

These related values are shown very distinctly in chart Fig. 2. Here it will be noted also that the highest limit of hardness in a spring should be about 80, but 75 will make not only a very strong spring, but also a very tough one. A spring at 60 hard shows a large loss of elastic strength, but may, for example, pass for automobile service, if hardened all through; a few degrees less than 60 hard, however, betokens certain failure by sagging and early breaking; 60 hard is therefore the minimum, while for general purposes 75 is the maximum hardness and is suitable for high duty springs. In this connection, it may be stated that the nearer a spring is to its maximum hardness the greater will be its latitude of elastic flexure and the more resilient the suspension. Conversely, a spring which is too soft to yield a high elastic power will require compensation by extra thickness

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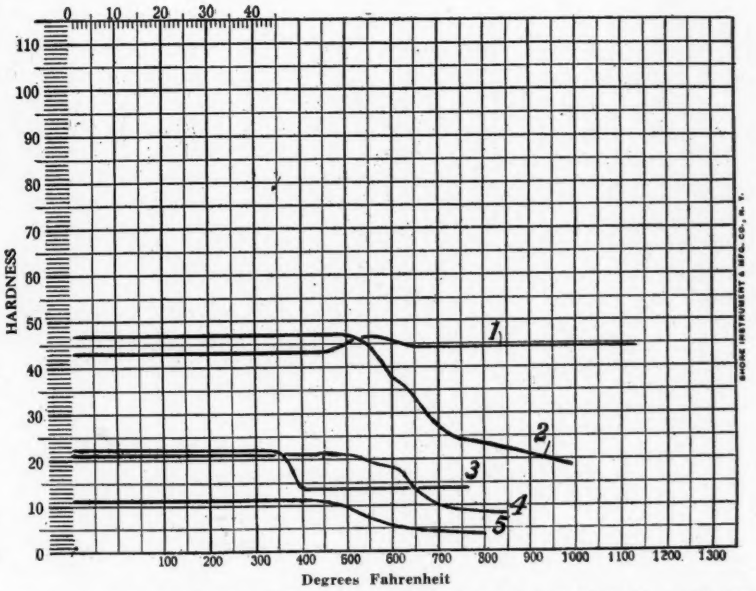


Fig. 3—Annealing chart for shop practice showing the effect of annealing heat on cold rolled metals. No. 1 is Hard Rolled Brass; No. 2, Mild Steel; No. 3, Hard Rolled Zinc; No. 4, Hard Rolled Copper; No. 5, Hard Rolled Aluminum.

NEWS *of the* INDUSTRY

Can You Use Short Lengths?

SOME manufacturer who can use short lengths of steel wire to advantage may be the gainer as the result of an item that appeared in these columns last month. It will be recalled that we reported a profitable use that was discovered for a former waste product in the shape of short lengths of copper wire which were found to be suitable for lead-ins in radio condensers. The story prompted the following letter from a large Eastern wire mill which we will gladly identify for any interested inquirer:

"We accumulate a considerable quantity of assorted short lengths 3 feet and shorter, gauging from No. 12 to No. 16 inclusive. Part of this is of high carbon content and part low carbon Bessemer, both kinds being black annealed. If you could find an outlet for this material we could sell at a very low figure as same is now compressed and sold as Balled Wire Scrap".

Foreign Trade Opportunities

FOREIGN trade opportunities reported by the U. S. Bureau of Foreign and Domestic Commerce during the month of September include inquiries from the following sources: For springs (upholstery) and curtain fasteners (33284) from Durban, South Africa; for wire gauze (33289) from Cairo, Egypt; for wire, iron rivet, and barbed wire of all gauges, Birmingham, England (33215); for instruments, including technical or mechanical apparatus (33335) from Zurich, Switzerland; for nails, bolts and nuts (33370) from London, England; for wire, barbed, fence and gauge, and wire netting (33370) from London, England; for box strapping machines for packing fruit (33486) from Cape Town, South Africa.

All-India Industrial Exhibition

UNITED STATES manufacturers of industrial machinery are invited to participate in the All-India Industrial Exposition at Calcutta in December, the Department of Commerce is advised by the Vice Consul at Calcutta, Winfield H. Minor. The report follows in full text:

The All-India Industrial Exhibition, an annual affair in India, will be held this year at Calcutta during December, under the auspices of the Indian National Congress. Manufacturers of industrial machinery in the United States are being invited to participate in the exposition. According to the secretary of the exhibition there is a fairly large potential market in India for industrial machinery of practically all types. The exposition will open on December 15, and will continue until January 15, 1929.

Tungsten Patent Valid

In a decision reversing a ruling of the Federal District Court at Wilmington, Del., the United States Circuit Court of Appeals here on September 18th declared valid the Coolidge patent, owned by the General Electric Company, on a process of making filaments of drawn tungsten wire. This ruling grew out of the case of the General Electric against the DeForest Radio Company in which the former sought to restrain the DeForest Company from infringing upon what it declared was its patent rights.

Wire Block Patent Upheld

THE Board of Appeals of the Patent Office reversed a decision of the Examiner and issued a patent for a wire drawing block to James Stuart Phifer, assignor to the American Steel and Wire Company (Patent No. 1683482, Sept. 4). The appeal was made from the Examiner's rejection of the applicant's claim (No. 8) directed to a wire drawing block which differed from the prior art in that it included a solid ring provided with a smooth curved guiding surface for the wire, in lieu of a spring band which had formerly been employed and which did not provide a guiding surface. In the opinion of the Board of Appeals, the applicant's claim defined a construction which was a patentable improvement over similar structures.

Personal Mention

TINIUS OLSEN, of Tinius Olsen Testing Machine Co., Philadelphia, has been signally honored by the erection of a statue to him in his birthplace, Kongsberg, Norway, where unveiling exercises were held on September 16th. The cost of the tribute was met by popular subscription among Norwegian citizens in recognition of Mr. Olsen's philanthropies and contributions to the progress of engineering in Norway. Due to his advanced years, Mr. Olsen, who is eighty-three, did not cross the ocean for the ceremony, but was represented by his son, Thorsten Y. Olsen, who is vice president and treasurer of the Olsen Company.

Burley B. Ayers, advertising manager of the American Steel & Wire Company, Chicago, has announced his retirement from active business and has gone on an extended vacation in the North woods. Mr. Ayers' retirement at seventy years of age comes after thirty-two years of service with the wire company. During that time he has built up a wide circle of friends and acquaintances in the trade who are congratulating him on his vigorous health.

BERNARD LESTER, assistant industrial sales manager of the Westinghouse Electric and Manufacturing Company, has been placed in charge of the Company's business relationships with architects, builders, building contractors, and manufacturers of machinery and motordriven appliances. His headquarters are at 150 Broadway, New York City. Mr. Lester has been identified with the Westinghouse Company for over twenty years and is widely known in industrial circles.

Clinton S. Marshall, for 25 years district manager of Worcester Works of the American Steel & Wire Co., and for 50 years an employe of the company, has retired from the active management and has been made district superintendent, in which he will act in an advisory capacity.

J. Lester Perry, who has been Mr. Marshall's assistant, has been made district manager. He, too, has spent his business life in the employ of the American Steel & Wire Co. Before becoming assistant manager he was successively superintendent of South and North Works.

Two assistant district managers have been appointed, Clifford S. Hood, promoted from superintendent of South Works, and M. W. Reed, from superintendent of New Haven Works.

Peter Stewart becomes head of South Works with the title of general superintendent, and Albert J. Hoyt succeeds Mr. Stewart as superintendent of North Works. He is promoted from assistant superintendent of South Works.

F. L. Haven is made assistant superintendent of South Works, and George A. Green assistant superintendent of North Works. Edwin F. Barnes remains superintendent of Central Works. H. W. Jones is superintendent of New Haven Works, and R. C. Helm, superintendent of Trenton Works, which is also in the Worcester district.

Joseph A. Ashwell, has been made purchasing agent of the New Departure Manufacturing Company, Bristol, Conn., succeeding William A. Kimball, who recently resigned to engage in manufacturing at Newton, Conn. Mr. Ashwell was formerly purchasing agent of the American Bosch Magneto Company, Springfield, Mass.

The Universal Wire Machinery Company, Congress Avenue, New Haven, Conn., has been absorbed by the Wire Machinery Corporation of America, with its plant in Stiles Street. Both firms manufacture machinery for the insulation of wire and were independent of each other. The new directors are Raymond B. Girard, Merritt Vanderbilt, Josiah Judd, J. P. Barclay, and Leslie K. Allen, all of this city. Barclay was elected president, Allen vice president, and Vanderbilt treasurer.

COMING EVENTS

Oct. 8-12. American Welding Society at Philadelphia. M. M. Kelly, Secretary, 33 W. 39th St., New York City.

Oct. 15-18. American Hardware Manufacturers' Association at Atlantic City. Secretary, C. F. Rockwell, 342 Madison Avenue, New York City.

Oct. 8-12. American Society for Steel Treating at Commercial Museum, Philadelphia. Secretary, W. H. Eisenman, 7016 Euclid Avenue, Cleveland, Ohio.

Oct. 16-18. American Railway Bridge and Building Association at Boston. Secretary, C. A. Lichty, 310 N. Waller Avenue, Chicago.

Oct. 17-19. Society of Industrial Engineers at Rochester, N. Y. Secretary, 608 South Dearborn St., Chicago.

Oct. 17-27. Electrical and Industrial Exposition at New York. Secretary, Lincoln Bancroft, 124 W. 42d St., New York City.

Oct. 23-25. Bridge and Building Supply Men's Association at Boston. Secretary, W. D. Waugh, 322 South Michigan Ave., Chicago.

Oct. 23-28. Railway Electric Supply Manufacturers' Association at Chicago. Secretary, E. Wray, 9 South Clinton St., Chicago, Ill.

Oct. 23-26. International Association Municipal Electricians at New Orleans. Secretary H. N. Lang, Box 1864, Orlando, Florida.

Dec. 3-8. National Exposition Power and Mechanical Engineering, at New York. Secretary, C. Roth, 480 Lexington Ave., New York City.

Building and Expansion

Hoosier Fence & Wire Co., 1660 Astor Street, Indianapolis, has been incorporated with a capital stock of $50,000 to manufacture wire, iron and wooden fence, and garden furniture.

The Madison Wire Co., Buffalo, N. Y., has been chartered with a capital of 1000 shares of no par value to manufacture wire and wire products. The directors are Arthur G. Madison, Hotel Worth, Buffalo; Christopher Madison, Stroudsburg, Pa.; and Charles Horning, Eden, New York.

The Worcester Wire Works has enlarged its equipment for the manufacture of high carbon steel wires by the erection of an additional building, 66 by 210 feet and two stories, which will be used for manufacturing. It will give one-third more output.

Knight Screw Products Co., Detroit, Michigan, will build and equip a one-story factory addition at a reported cost of $25,000.

Central Steel & Wire Co., Chicago, will build additional factory unit at South Western Avenue and West Forty-fifth Place at a cost estimated at $200,000.

Cleveland Wire Spring Co., Cleveland, Ohio, will build a factory addition and warehouse at Harvard Ave. and E. 49th St. at an estimated cost of $75,000.

Davis Brothers, Inc., 4250 Wissahickon Avenue, Philadelphia, Pa., manufacturers of nails, spikes, etc., will build a one-story factory addition at a reported cost of $18,000.

A. Leschen & Sons Rope Co., 5909 Kennerly Avenue, St. Louis, Mo., will build a two-story addition at a reported cost of $35,000.

Sleeper & Hartley TRADE MARK

Practical Continuous We

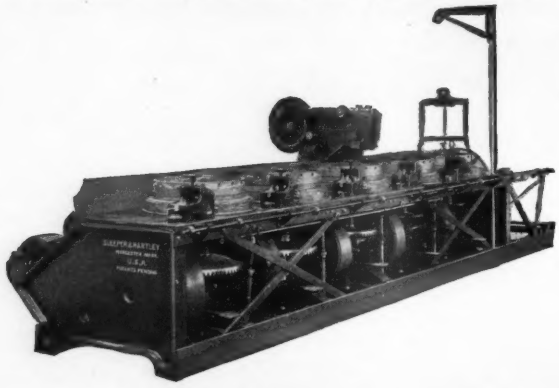
These Machines Go Into Production at -Red

Rod Frame

(No. 5—14 or 15 wire)

Patented June 3, 1924—May 12, 1925—others pending

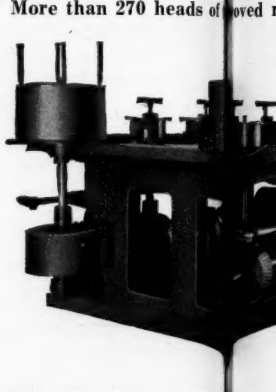
All Ball or Roller Bearings
No Differential Gearing.
Automatic Compensation for Speeds of Heads.



Double 5-Draft, In

No. 14 to No. 23, low
3 to 4 Blocks age
No. 14 to 19—4 00 lbs
No. 14 to 20—5 00 lbs

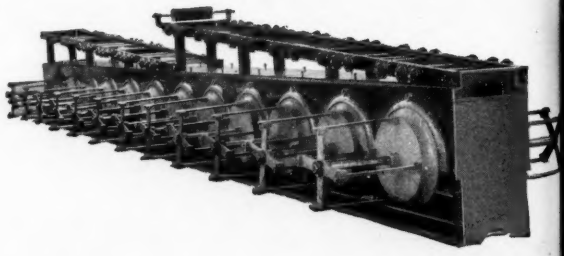
More than 270 heads of oved



IMPROVED WIRE MILL EQUIEN

Standard Rod Frame—10 Block

Long, Stiff Spindles, in anti-friction bearings, and equipped with friction Clutches. Powerful and reliable.
Practically noiseless in operation.
(New Plant of Thompson Wire Co., Worcester, Mass.)



Patenting Furnace Take-Up

(New Plant of Thompson Wire Co., Worcester, Mass.)

Dou

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(New

AGENTS: CHICAGO TERRITORY, Neff, Kohlbusch & Bissell, Inc. SAN FRANCISCO AND LOS ANGELES Louis G. Henes

SLEEPER & A

FOREIGN AGENTS AND REPRESENTATIVES: UNITED KINGDOM—Mr. Fredk. A. Perry, 63 Queen Victoria St., London, E. C. 4. FRANCE—Mr. Edgar Bloxham, 12 Rue du Delta, Paris. BELGIUM—Isbecque, Todd & Cie., 25-27 Boul. Emile Bockstael, Brussels. MONTREAL AND TORONTO—Arthur Jackson Machine Tool Co.

WORCESTER AS

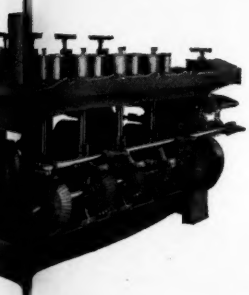
We Drawing Machinery

Sleeper & Hartley TRADE MARK

at—Reducing Overhead-Increasing Production!!

aft, Intermediate

23. r low carbon wire.
cks rage Operator.
–4 00 lbs. per block.
–5 00 lbs. per block.
s of oved model in operation

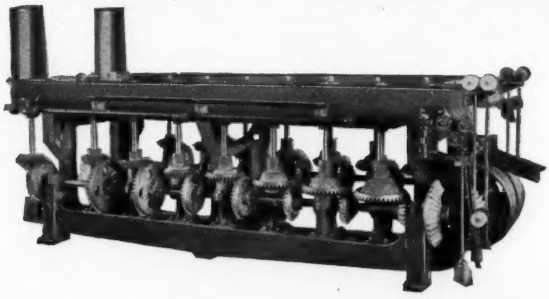


Double 8-Draft Fine Wire: Wet

No. 22 to 36. High or low carbon wire.

6 Blocks to Average Operator, 22-33, 8-hole, 660 lbs. per day of ten hours.

Many thousands of these heads in operation



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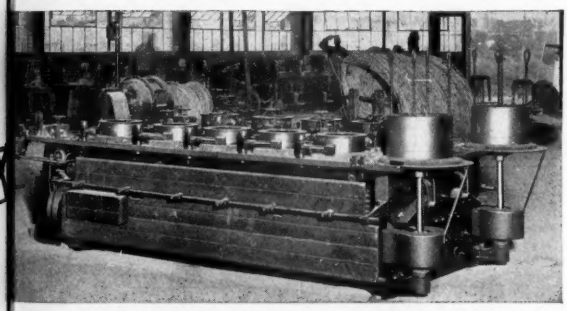
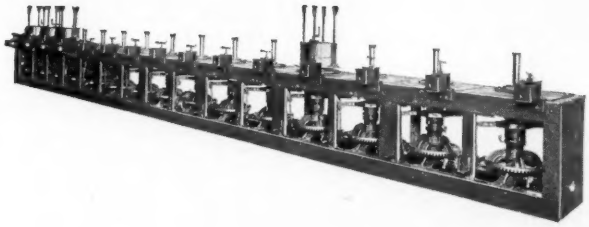


Double Six—Draft Dry Continuous For High Carbon Wire

irect driven with silent chain. Cut gears throughout. Anti-iction bearings. Variable speed for finishing block.

(New Plant of Thompson Wire Co., Worcester, Mass.)



Heavy 16″ Frame For .65 Carbon Wire No. 10½ to .037″

15 Blocks: Motor driven. Silent chain. Anti friction bearings and cut gears throughout.

(New Plant of Johnson Steel & Wire Co., Worcester, Mass.)

& ARTLEY, Inc.

Agents: Philadelphia Territory
Swind Machinery Co.

ITALY—Henry Coe & Clerici, Milan. AUSTRALIA AND NEW ZEALAND—Edwin Wood Pty., Ltd., Melbourne.
JAPAN—Andrews & George Co., Toyko. SWEDEN AND FINLAND—Maskinaktiebolaget Karlebo, Stockholm.

ER ASS., U. S. A.

The World's Largest Testing Machine

Testing of gigantic cables for new Hudson river bridge requires machine with a pull of two million pounds

IT was only natural to expect that the design of a suspension bridge of the magnitude of the Hudson River Bridge between upper Manhattan, New York City and Fort Lee, N. J., would produce a host of problems. With 3500 feet intervening between towers, the structure will have a main span of the Delaware River Bridge, now the suspension bridge with the longest single span in the world.

Chief among those who were without precedent to guide them in solving a major problem was the management of the John A. Roebling Sons Company of Trenton, N. J., the firm that built the cables for the famous Brooklyn Bridge. The problem of chief concern to Roeblings was not that of producing or twisting wire, but that of proving to their own satisfaction what combination was the right one capable of bearing the enormous stresses and strains to be contended with.

To test such gigantic cables as must be employed, there was not then in existence a testing machine of a size sufficient for the purpose. No sooner was the need for such a machine apparent than Roeblings made plans to purchase one capable of exerting the tremendous pull of 2,000,000 lbs. Riehle Bros., of Philadelphia, were assigned the task of creating this, the greatest universal testing machine in the world today. The engineering details here set forth explain the important features sufficently to enable the reader to visualize the mammoth machine.

The Straining Section

A very essential part of the straining mechanism is the upper or stationary head which is held in position by pins or keys passing through slots in the columns. There are three sets of these slots, thus giving the operator the choice of three different positions of the upper head. The operation of changing the position of the head is greatly facilitated by a device which withdraws or forces in the key by means of a screw and handwheel. The adjustable head is raised or lowered to the desired position by the moving head, while the keys and their respective operating apparatus are handled by the crane which serves the machine.

No Wedge Grips Employed

The pulling head is moved up and down as desired by three pulling screws turning in manganese bronze nuts forced into the head and held in place by keys and lock-nuts. The two heads are massive steel castings, 24" thick and weighing nearly 25,000 lbs., each. They are pierced by rectangular cored slots to permit the specimen to pass through, while the lower surface of the pulling head and the upper surface of the fixed head have machined tee-slots to permit the attachment of suitable tools of fixtures for various types of specimens. Owing to the special nature of the work to be done the customary wedge grips are not employed in this particular design.

There are three pulling screws, one of which is 11½" in diameter, 38' 4-⅝" long and weighing 13,620 lbs. This screw sustains a load of 1,000,000 lbs., at full capacity. The other two are 8½" in diameter of the same length as the front screw and weighing 7,470 lbs., each. They sustain a load of 500,000 lbs., each at full capacity. The use of three screws insures complete stability of the pulling head and also a uniformly proportionate loading of each screw. The reversed screw principle, a Riehle patented feature, is employed so that the rotative effect on the head resulting from friction of the screws turning in the nuts is practically neutralized.

The screws are rotated by a train of gears. These are all steel castings or forgings and with ample strength to sustain the heavy loads placed upon them. The spindles or shafts on which they are mounted are carried in radial roller bearings top and bottom with thrust bearings underneath to carry their weight. The pull of the screws is taken on large roller thrust bearings with spherically seated washers for self-alignment.

Passing from the main gears under the table, we come next to the speed change gears and friction clutch assembly. These are all mounted in a cast iron box as a separate unit bolted to the base of the machine. A selective gear change is a unique feature of this portion of the design. Four different pulling speeds may be obtained as desired, by throwing a single lever to any one of four positions. A second lever serves to operate the clutch for starting the machine in either direction or for stopping. The gearing is continuously flooded with oil and a central sight feed oiling system is provided for all bearings. A rotary geared pump delivering to a tank mounted outside of the gear box insures a constant and ample supply of oil for the entire system.

Remote Electrical Control

Power is derived from a 75 H. P. Reliance 800-1600 R. P. M. Adjustable Speed Motor transmitting through a Link-Belt Silent Chain Drive, fully enclosed and with an individual

(*Please turn to page 350*)

A Survey of the Australian Market For Wire and Cable

Government is largest purchaser and American shippers face stiff price competition with firmly entrenched British manufacturers

IN a report prepared for the Bureau of Foreign and Domestic Commerce, H. R. Buckley, Assistant Trade Commissioner at Sydney, Australia, presents the following survey of the Australian market for wire and cable:

The Australian market for wire and cable, for many reasons, presents difficulties to American manufacturers. The largest consumers of wire and cable are the public utilities, which in practically all cases are operated by municipal, State, or Federal Governments. This group includes the telephone and telegraph systems, the electric lighting and power plants, and the railways and tramways. There is a continual current of propaganda for the encouragement of trading within the British Empire, which is fostered by the press, and, except in cases where equipment is not obtainable in Great Britain, or where the article of foreign competition is superior, or much lower in price, the Government seldom makes purchases from other than British or local manufacturers. In fact, when American or other foreign-made equipment is considerably cheaper, and unquestionably more suitable, the preference often is given to the Empire. This trend, in conjunction with the fact that in this particular field the volume of business is Government controlled, limits the potential market for American manufactures.

Specifications Suited to English Practice

Australia is British, and engineering practice naturally follows that of the mother country. Within the last few years, the Australian Institute of Engineers has worked out standard specifications especially suited to local requirements and conditions, but these specifications are still based mostly on English practice, and the difficulties existing for American manufacturers in the difference between their practice and the British practice have scarcely been eliminated.

Australian imports of wire and cable by countries of origin, fiscal year 1925-26

Class and country or origin	Value
Wire and cable (covered):	
United Kingdom	£19,169
United States	461
Others	46
Total	19,676
Telegraph and telephone wire (paper insulated and lead covered):	
United Kingdom	30,709
Other wire and cable:	
United Kingdom	1,326,977
United States	39,472
Others	16,343
Total	1,382,792
Brass Wire:	
United Kingdom	22,051
United States	210
Others	237
Total	22,498
Copper wire, including stranded or twisted wire:	
United Kingdom	£116,200
United States	5,268
Others	576
Total	122,044
Wire, woven, over 30 holes to lineal inch:	
United Kingdom	3,933
United States	141
Others	910
Total	4,984
Wire, woven, for paper-making machines:	
United Kingdom	2,906
United States	34
Total	2,940
Wire, not elsewhere included:	
United Kingdom	15,328
United States	18,447
Others	290
Total	34,065

British Cable Makers Association

Another factor which has had a strong influence on the development of the present situation is the British Cable Makers Association, which has built up such a reputation for excellence of material that it has become almost a universal practice to specify it when calling for tenders. This group has become so powerful that it now publishes a universal price list applying to the products of all members of the association. For a time Government orders were rotated between the various manufacturer members of the group. Within the last two or three years, however, non-members, both British and German manufacturers, have been underquoting the association on some materials, and have forced the association to reduce its prices in order to kill competition.

Imports of Wire and Cable Predominatingly British

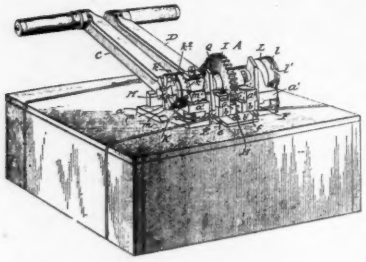
The British manufacturer has intrenched himself firmly in the market; just how firmly is illustrated by the accompanying import statistics for the fiscal year July, 1925, to July, 1926:

Bare Wire and Cable

The bulk of the requirements in bare wires and cables is supplied by a local manufacturer, Metal Manufactures (Ltd.), established at Port Kembla, New South Wales. This firm is controlled jointly by the British Insulated and Helsby Cables Co. (Ltd.) and the Electrolytic Refining & Smelting Co. of Australia (Ltd.). The firm Metal

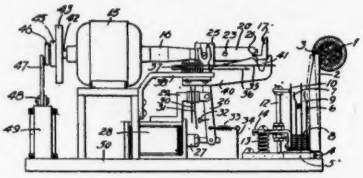
(*Please turn to page 352*)

A REVIEW OF RECENT PATENTS



Wire Tying Machine 1,682,015

Complete descriptions and drawings of any of the patents referred to on this page may be had for twenty five cents. Address orders to Wire & Wire Products, 551 Fifth Avenue, New York City.



Cable Splicing Machine 1,681,245

1,681,245. CABLE SPLICING MACHINE, Patented August 21, 1928, by David T. May, of Port Washington, and Charles G. McCormick, of New York, New York, Assignors by Mesne Assignments to Western Electric Company, Incorporated, a Corporation of New York. This invention relates to a machine for splicing cable and particularly to the splicing of telephone and telegraph cables. The principal object of this invention is to provide a compact, rapid and efficient machine for splicing the wires of a cable so as to make a uniform solderless splice in a short time without the necessity of employing the art of a skilled manual cable splicer.

1,682,015. WIRE TYING MACHINE. Patented August 28, 1928, by John Sherman McChesney, of Chicago, Illinois, Assignor by Mesne Assignments, to The Gerrard Company, Inc., of San Francisco, California, a Corporation of Delaware. A machine for tensioning a tie wire tightly around a package or box. The machine embodies an appropriate frame provided with a throat for the reception of overlapping portions of a looped tie rod, a lever, controlled tension means including a plurality of rotatable heads to which the respective end portions of the tie wire are adapted to be connected, a lever-controlled tie joining means whereby the ends of the tie are united while said tie is under tension, and tie-cutting means for severing the tie adjacent the splice or knot subsequently to the tying operation, whereby the tie-cutting means operates to disconnect the machine from the applied wire tie so as to enable the operator to shove the machine away from the applied tie.

1,679,490. CABLE PULLING DEVICE, patented August 7, 1928, by Henry L. Parker, of Chicago, Illinois. A cable pulling device especially adapted for pulling cable ends into man holes or the like, preparatory to the splicing operation. The inventor provides a sleeve construction of a plurality of abutting and telescoping sleeve sections including a main section and a plurality of interchangeable sections. The main section has fastened thereto metallic straps for enabling it to be connected to the pulling chain. This section is adapted to be used independently of the other sections and may be used by itself to enable the cable to be pulled from the conduit whenever only a slight length of cable is needed for the splice. The interchangeable sections include telescoping portions and are adapted to be placed under compression by the main section.

1,682,009. COMBINATION TOOL. Patented August 28, 1928, by Claude A. Kinney, of Hannibal, Missouri. This combination tool is particularly adapted for use in constructing wire fences. It provides a tool which includes in its construction means for pulling staples, nails, tacks, and the like, together with means for strechning and cutting strands of wire, and embodies in its construction pivotally connected parts which can be folded to occupy a minimum space when not in use.

1,681,610. MACHINE FOR TYING WIRE TIES. Patented August 21, 1928, by Henry B. Foulder, of Glenbrook, Connecticut, Assignor to J. P. Curry Mfg. Co. Inc., of Stamford, Connecticut, a corporation of New York. This invention relates to machines for tying wire ties, and more particularly relates to power driven bench tools, for twisting wire ties about the necks of bags, the tools being adapted to be started at the will of the operator to automatically give a tie a predetermined number of twists and then to release it from the machine, automatically stopping in proper position to receive and to operate upon another tie.

1,682,016. METHOD OF AND MACHINE FOR PRODUCING DEFORMED WIRE TIES. Patented August 28, 1928, by John Sherman McChesney, of Chicago, Illinois, Assignor by Mesne Assignments, to The Gerrard Company, Inc., of San Francisco, California, a Corporation of Delaware. A method and machine for making wire ties, preferably deformed ties, with its object to economically produce the article by a new mode of procedure and with a greatly increased capacity of the machine. In contradistinction to reciprocating wire cutting means heretofore commonly used, this invention includes a rotary cutting member provided with a multiplicity of cutting edges, and trip-controlled actuating means therefor by which a rotative step feed motion is imparted to said multiple cutter, whereby on each rotation of the cutting member the wire edges hereof act successively on the wire, thus minimizing the wear on the individual cutting edges and greatly prolonging the service of the cutter without stopping the machine to sharpen the cutting edges or to replace a worn cutter with a fresh cutter.

1,682,074. METHOD FOR THE MANUFACTURING OF SNAPPERS FOR SNAP RINGS. Patented August 28, 1928, by Bernhard Forster, of Pforzheim, Germany. A method of manufacturing snappers for unslit snap-rings from wire of circular cross section by means of a punch and of a hollow swage, consisting in securely holding during the bending a straight wire, which has been set-off near one end, in a punch in such a manner that the transverse central axis of the straight portion of said wire coincides with the axis of the punch so that when said punch is penetrating into the hollow swage the straight portion of the wire is uniformly bent to both sides to form a semi-circle.

1,681,680. BEAD FOR PNEUMATIC TIRES. Patented August 21, 1928, by Robert C. Pierce, of Niles, Michigan, Assignor to National-Standard Company, Niles, Michigan, a Corporation of Michigan. A reinforcement for tire beads which is substantially non-stretchable and in one form of the invention the reinforcing element used consists of three parallel wires held in parallel relation by a thin strand of wire woven diagonally back and forth. The bead is of such construction that they may be made on the mandrel or form as the complete bead is being made up, or the element may be so disposed apart from the bead and formed into a completed annulus which is inserted in the bead as the same is formed.

DIGEST OF RECENT TRADE LITERATURE

Making Nuts and Bolts From Billets. Iron Age, August 30, 1928, P. 516.

A description of the methods and equipment in use at the plant of the Buffalo Bolt Co., North Tonawanda, New York, where these products are made from raw materials to finished products, including steel rolling and wire drawing. The nuts and bolts are hot forged or cold headed and then heat treated. The hot forge department is equipped with sufficient mechanical headers for bolts and punch presses for nuts to turn out one million bolts and five million nuts daily. There are seven high-speed hot bolt-heading machines fed by wire in coils, the first end of one coil being welded on to the rear end of the preceeding coil so that the machines run without interruption. The principal feature is the forging furnace which is coupled to each. The wire from the coils passes first through the furnace, where it acquires the correct forging temperature, and then directly into the machine, which heads, shears and ejects the bolts automatically. This arrangement necessitated automatizing the heating operations and the designing of a furnace with sufficient capacity to deliver wire at forging heat at a very high speed. This is said to be one of the very few instances in industry where the two operations of heating and forging have been synchronized into straight line production.

Patents (Law and Practice). Richards & Geier, patent and trade-mark attorneys, 274 Madison Avenue, New York City.

Fourth edition of 48-page bound book published for free distribution to interested inquirers. Contains digest of law and outline of practice, describes routine of procedure in obtaining and protecting patent rights, with information about fees, assignments, shop rights, employer - employee equities, etc., and a thorough tabulation of significant facts about foreign patents, charges, applications and assignments.

Note on Practical Pyrometry. The Institute of Metals, London, England. 12 pages, illustrated.

A paper prepared for presentation at the Liverpool meeting of the Institute, in September, by G. B. Brook, F. I. C., and H. J. Simcox, B. Sc., respectively chief chemist and assistant chemist, British Aluminium Co., Ltd. The authors outline the difficulties, such as stray current and magnetic fields of great intensity, which are peculiar to industries where large currents are used and describe the design of an instrument which eliminates these and is accurate even when placed in the field surrounding a conductor carrying as much as 20,000 amperes. Various minor difficulties are dealt with, and a description is given of a quick-reading thermocouple which is suitable for use in non-ferrous foundries.

Purifying Steel With Sodium Compounds. The Blast Furnace & Steel Plant. September, 1928. P. 1204.

Increased ductility, as shown in physical tests, is one of the advantages of the sounder metal now being satisfactorily produced as the result of using sodium carbonate as a deoxidizer. Dr. Charles T. Hennig, Consulting Metallurgist, Pittsburgh Plate Glass Company, is credited with having made the use of cheap sodium possible when applied to tonnage practice in both the open-hearth and Bessemer processes. Steel made by the addition of the sodium mixture is said to be clean and dense, showing a better rolling quality and much less rejection. It also indicates a lessened sensitiveness to the bad effects of sulphur, either residual or added, and finished products present a clean surface.

Trade Literature Received

Electric Furnaces

"Electric Furnaces". The Ajax Metal Company, Philadelphia, Pa. 16-page illustrated catalogue describing the company's induction furnace for electric melting of non-ferrous metals. According to the foreword, over 95% of the metal melted electrically and over 50% of the metal melted in the brass rolling industry is melted in this furnace. A supplementary technical article describing the electric heating principle involved is available to engineers and foundrymen.

Insulating Machinery

"Perfected Insulating Machines." John Royle & Sons, Paterson, New Jersey. 28-page illustrated catalogue of machines for applying die-formed rubber or plastic coatings upon electric conductors and other wires.

Wire Cutters

"Bolt Clippers and Wire Cutters." H. K. Porter, Inc., Everett, Mass. 38-page illustrated catalogue, which includes descriptions and prices of bench and hand tools for cutting chain, nuts and bolts.

Silver Solders

"The Handy Book of Silver Solder." Handy & Harman, 57 William Street, New York City. 20-page illustrated booklet describing the company's solders with varying degrees of silver content for specific purposes and melting temperatures. A supplement contains instructions for getting best soldering results. with hints on proper cleaning, fitting and fluxing.

MOSSBERG PRESTEEL PRODUCTS

Pressed Steel Reels

With Detachable Heads

For handling copper and insulated wire. Take commercial paper-core coils.

STRONGLY built, with radial ribs and a simple yet very effective locking device that is strong enough to withstand any working strain.

Covered by the Following Patents

May 7, 1918 *December* 7, 1920 *June* 20, 1922

MOSSBERG

PRESSED STEEL CORPORATION

Attleboro — Massachusetts — U. S. A.

140 So. Dearborn St. Chicago, Ill.

Russell A. Singleton Co. 2016 Cockrell Ave. Dallas, Tex.

33 Norwood Place Greenville, N. C.

Diamond Dies Giving Uniformity in Production

ACCURATE DEPENDABLE

REASONABLE IN PRICE

USED FOR YEARS IN LEADING WIRE MILLS

Our experts will solve your die problems.

Write for information about Dependable Diamond Dies

BALLOFFET DIAMOND WIRE DIES, Inc.

342 Madison Ave. New York City

British Government Places Foreign Wire Orders

SEVERE criticism of the British Post Office has arisen as a result of its action in placing a contract in France for approximately £100,000 ($500,000) worth of bronze wire for the telephone service of the United Kingdom. The Post Office has been quick to issue a defence of its action. It had been stated, on behalf of domestic manufacturers whose tenders were rejected, that the contract has been placed with the Trefiliere Company, of Le Havre, that the quantity of bronze wire involved is sufficient for the requirements of the telephone service during the current year, and that from 1,000 to 1,200 tons of this wire are purchased in a normal year from domestic firms at an average cost of approximately £100 ($500) per ton. The official reply of the Post Office is as follows:—

Official Explanation

"It is the settled policy of the Government not to disclose contract prices, and the Post Office therefore cannot publish the value of the order for bronze wire which has been placed abroad. The Select Committee on Estimates of the House of Commons recommended, after consideration of the effects of a 'ring' on prices quoted to the Post Office, that the Post Office should have a free hand to accept tenders from abroad in cases where it is unable to obtain satisfactory evidence that the prices quoted by British manufacturers are not excessive; and in the present case there was no satisfactory evidence to that effect and considerable evidence to the contrary.

"The prices quoted on behalf of the associated British makers for the manufacture of the bronze wire (apart from the cost of the principal raw material, copper, which would necessarily be imported, whether the order for wire went to a Brit-

ish firm or not) compared very unfavorably, not only with the foreign prices for bronze wire, but with the British prices for manufacture of copper wire, in which there is effective competition from British firms outside the association.

"Nevertheless, the Post Office did not place the order abroad until it had made every effort to induce the British firms to quote a reasonable price, and it even suggested to them a price (allowing a substantial margin over the foreign price) at which it was ready to place a large order at once."

The contract placed in France involved an expenditure of between £60,000 and £100,000 ($300,000 and $500,000). In an interview, an official of one of the largest British firms said:—

Manufacturers Protest

"The Post Office has been pressing us for years to lower our prices and we have made sacrifices for the sake of peace. Now we have absolutely reached the limit, and the Government wants further reductions. It cannot have them because we have been supplying material at prices which are absolutely uneconomic. As far as we are concerned, our dealings during recent times with the Post Office have not been on a commercial basis. In fact, we have been getting nothing at all out of it. It is unfortunate that the contract should go abroad, but obviously we cannot compete with the French prices. The Post Office authorities are evidently under the impression that because we have a trade association our prices have been forced up. This is far from the fact. It is due to a misunderstanding of the whole position. They have got it on the brain—they want to smash the association. Whenever the association quotes them figures they immediately jump to the conclusion that it is a high one. The result was inevitable in view of the Post Office attitude."

EST. 1855 AIMCo INC. 1918
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.

517 Huntington St.
PHILADELPHIA PENNSYLVANIA U.S.A.

MACHINES FOR
DRAWING
RESPOOLING
SATURATING
RECLAIMING
ENAMELING
INSULATING
PANNING
VULCANIZING
TAPING
OF WIRE

MULTIPLE PULL-OUT
With TRAVERSE for 8 Reels.
Has 8 Independently Operated
FRICTION CLUTCHES

KILMER LITTLE GIANT WIRE FORMER

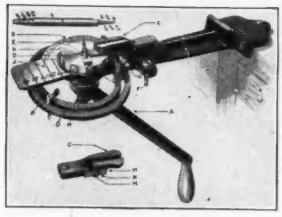
Forms Eleven Sizes of Eyes from Round, Square, Flat or Half-Round Stock, also almost any shape desired Quickly and Efficiently.

Adjustable for No. 8 to No. 24 Gage Wire.

The cut on the left shows a few of the thousands of the forms made on this

FORMER

Price $50.00



Patented April 2, 1918

M. D. Kilmer & Co.

Cleveland, Ohio, U. S. A.
Box 237, Station B.

"PREMIER"
Trade Mark of D. H. Co.

. . *"Your Dies Are Very Satisfactory"* . .

Says Wire Manufacturer

This manufacturer was so pleased with "Premier" dies that he sat down and wrote us about them.

Satisfactory service is insured by Driver-Harris' 20 years experience in drawing alloy wires.

"Premier" Diamond Dies draw true to expectation any metal in any size suited to diamond die drawing—with a marked decrease in interrupted production—repair work—and replacement costs.

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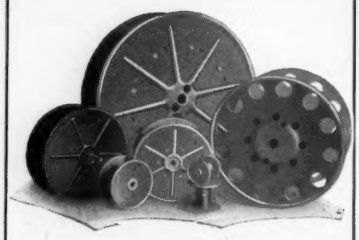
Alloy Makers since 1899



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Modernize your equipment by using these light and durable reels made by a company thoroughly versed in pressed steel work.

Apco Mossberg

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Specialists in Developing Steel Reels for Annealing, Vulcanizing and Stranding; Also Bobbins for Wire Handling.

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Wire Working Machinery

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The World's Largest Testing Machine

(*Continued from page 344*)

pump delivering a constant flow of oil to the chain. The electrical equipment is of remote control type with push button station for starting and stopping. Close speed regulation is obtained by an interpolating rheostat for field control, a tachometer being used to indicate any departure from the correct speed. The tachometer and electrical control equipment are all mounted on a panel board conveniently located.

The Weighing System

While the loading or straining system is necessarily of a very heavy and rugged construction throughout, it is, however, in the weighing system that we find the heaviest and most massive parts. Of these the table is the most prominent and impressive. This is a one-piece steel casting 13′0″ long by 11′1″ wide on its upper surface and weighing 48,850 lbs. At full capacity, it sustains the total load of 2,000,000 lbs., which it in turn transmits to the lever system on hardened steel knife edges. These are designed for a unit load of 10,000 lbs., per linear inch so that the total length of knife edge is in excess of 200 inches.

The lever system in itself presents many novel features of design. Two primary main levers, identical in size and form, are mounted on opposite sides of the machine with their noses turned toward the centre each carrying the tremendous load of 1,000,000 lbs. A fraction of this is transmitted to a pair of secondary intermediate levers by which, now reduced to 1,000 lbs., it is transmitted to the weighing beam.

All the knife edges are of high-grade tool-steel, hardened and ground to size. Eleven different samples of tool-steel were machined to shape, heat treated and tested before a final selection was made. The main levers are supported on a very rigid

and heavy steel casting known as the coverplate. This piece, which weighs over 41,000 lbs., is one of the most vital parts of the machine and performs many important duties. In addition to providing support for all the weighing levers, it absorbs the pull from the screws, houses the main bearings for the screws and the upper bearings for the gearing below it and also affords an anchorage for the recoil apparatus which takes the heavy shocks occurring when specimens break under large loads.

Three Separable Poises

This recoil apparatus, a new design, is of the hydraulic type. It is entirely automatic and in no way affects the accuracy or sensitiveness of the beam. The load is weighed on a beam of the conventional type on which the poise is moved by a screw operated through a train of gears by a hand-wheel. The screw carries a micrometer dial for reading small increments of load. The only unusual feature is the use of three separable poises by which it is possible to indicate fractional readings of ¼ and ½ as well as full capacity. The entire machine weighs about 275,000 lbs., and is 42′ 10-¾″ high. Its extreme width is 13′ and its length 21′. The maximum length of specimen which can be tested is 25′ while the clear space of 75″ between the screws provides ample room for large pieces.

The capacity of this machine is sufficient to pull apart a bar of structural steel nearly 6″ square or to crush a cast-iron column 15″ in diameter, 15′ long with 1¼″ walls. At full motor speed the pulling head may be operated at speeds of—10″, 2″, .5″ & .1″ per minute while at slow motor speed pulling speeds of—5″, 1″, .25″, and .05″ per minute are available.

The machine is now located in a specially built laboratory building at the Roebling Plant in Trenton and is being used daily for carrying out tests in conjunction with their research and inspection work on the Hudson River bridge cables.

WIRE INSULATING, STRANDING AND CABLING MACHINERY

NEW ENGLAND BUTT COMPANY

Office and Factory
304 Pearl St., Providence, R. I.

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We build a complete line of Stranding Machines, Cabling Machines, Closing Machines, Rubber Strip Covering Machines, Measuring Machines, and Other Allied Machines for the Wire Trade.

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TRENTON, N. J.

WIRE DRAWING MACHINERY & EQUIPMENT
ROD FRAMES—16″ FRAMES AND 8″ FRAMES—TAKE-UP FRAMES
WIRE POINTERS—PULLER TONGS

General Castings For Wire Mill Use

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Without charge or obligation, we will inform you on any questions you may put to us touching on patent, trade-mark and copyright law. You may ask: "Should I protect myself by patent or register under the trade-mark or copyright laws? What kind of a patent should I obtain?" and many other questions that may occur to you. These are vital points to consider and questions will be cheerfully answered.

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Before disclosing your invention to anyone send for blank form "EVIDENCE OF CONCEPTION" to be signed and witnessed. As registered patent attorneys we represent hundreds of inventors all over the United States and Canada in the advancement of inventions. The form "Evidence of Conception," sample, instructions relating to obtaining of patents and schedule of fees sent upon request.

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Wire Drawing Soaps and Compounds
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Netting Pinions for Wire Netting Machinery

(For hexagon and triangular netting) made from a Special Steel of about 70—80 kg solidity, and

hardened Screws (bushes for same)

First class workmanship, in all sizes wanted, as per sample or drawing.

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of a firm of diamond die specialists which is not interested in manufacturing and selling anything **BUT** diamond dies.

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VIANNEY

Founded in 1890 Incorporated in 1910
The oldest and largest Diamond Die plant in the world.
DIES of every weight for every purpose
100-5th Avenue **New York City**

A Survey of the Australian Market for Wire and Cable

(*Continued from page 345*)

Manufacturers (Ltd.) takes wire bars from the Electrolytic works and produces hard-drawn telephone wires, bare-stranded cables, soft copper wires, cotton-covered magnet wire, and copper and brass tubes. It has also been producing lead-covered paper-insulated telephone cable successfully. A large portion of cable, which is intended for use by the telephone branch of the postal department, is still obtained from abroad, although undoubtedly the local production will increase now that success has been obtained in development activities.

Materials Tested

Wires and cables are subjected to rather stringent official tests from time to time, another factor which adds somewhat to the difficulties of the manufacturer entering the field. Material is tested by the universities in the various State capitals for the customs authorities, although once a manufacturer has successfully passed the required tests his material is only periodically tested afterwards to assure that the original standard is not being lowered. Application for tests and requirements are submitted to the customs department.

Methods of Sales

Practically all the business in imported wire and cable is obtained by local branches of overseas firms. The parent company assumes all financial responsibilities, provides and maintains a stock, puts up the tender guaranties, and keeps a staff. The position of the Cable Makers Association in the market is so strong that American manufacturers probably could not make much headway, unless they were willing to operate on the same basis. An alternative might be for an American company to appoint a representative and give him the powers and assistance that would be accorded to its own factory representative. Several manufactur-

ers of different types of wire and cable might find it advantageous to combine and work together, maintaining one office. The ability to compete on a price basis, in view of the high duties, would be the first consideration.

Although Government business constitutes the greatest part of the wire and cable trade in Australia, the remainder is well worth consideration. If price can be made competitive, the quality of American material, combined with properly directed and intensive sales effort, should find an ever-increasing and worth-while market.

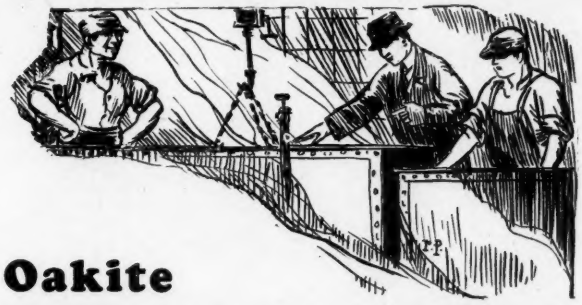
Imported Alloys Replace Chilled Iron in Drawing Dies

(*Continued from page 331*)

on steel wire, the production in most cases is greater than on diamond dies.

There are two metals on the market. One, under the trade name of Widia in Germany and Un-widia in the United States, and the other under the name of Wallramite. Both are practically of the same components, except that they are prepared differently. But, from what we understand, the patents are intercombined.

The writer has personally investigated the production in a number of mills in Germany, as well as in England, on copper wire, as well as steel, and the results were amazing. There are records, actually showing 1½ million pounds and more of wire drawn on a single die. These dies, in the first place, have solved the problem of loss of production on the machines, by entirely eliminating restringing, increasing production at least by 20%. The wire is very much improved in quality and it has been made much easier for the diamond dies on finer sizes, due to the much better product being fed to them. While there is no change in the machinery or holders necessary in order to adapt these dies, there are certain conditions, as far as shapes and lubricants are concerned, which must be abided by and which will be considered at another time.



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ARE your wire-drawers having trouble with scale-coated rods? Then check up on your cleaning practice. Use Oakite materials for cleaning before pickling and eliminate the damage and delay which improperly cleaned rods encourage.

Oakite cleaning materials remove all the grease and oil film from the wire—do their job thoroughly and quickly—make satisfactory pickling certain—lengthen the life of your dies. In many wire cleaning operations Oakite materials can effect savings you will want to know about.

Talk with one of our Service Men. He will be glad to explain Oakite advantages. Write and he will call. No obligation.

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Oakite Service Men, cleaning specialists, are located at

Albany, N. Y., Allentown, Pa., *Atlanta, Altoona, Pa., Baltimore, Birmingham, Ala., *Boston, Bridgeport, *Brooklyn, N. Y., Buffalo, *Camden, N. J., Canton, O., Charlotte, N. C., Chattanooga, Tenn., *Chicago, *Cincinnati, *Cleveland, *Columbus, O., *Dallas, *Davenport, *Dayton, O., *Denver, *Des Moines, *Detroit, Erie, Pa., Fall River, Mass., Flint, Mich., Fresno, Cal., *Grand Rapids, Mich., Greenville, S. C., Harrisburg, Pa., Hartford, *Houston, Tex., *Indianapolis, *Jacksonville, Fla., *Kansas City, Mo., *Los Angeles, Louisville, Ky., Madison, Wis., *Memphis, Tenn., *Milwaukee, *Minneapolis, *Moline, Ill., *Montreal, Newark, N. J., Newburgh, N. Y., New Haven, *New York, *Oakland, Cal., *Omaha, Neb., Oshkosh, Wis., *Philadelphia, Phoenix, Ariz., *Pittsburgh, Pleasantville, N. Y., Portland, Me., *Portland, Ore., Poughkeepsie, N. Y., Providence, Reading, Pa., Richmond, Va., *Rochester, N. Y., Rockford, Ill., *Rock Island, *San Francisco, *Seattle, *St. Louis, *St. Paul, South Bend, Ind., Springfield, Mass., Syracuse, *Toledo, *Toronto, Trenton, *Tulsa, Okla., Utica, N. Y., *Vancouver, B. C., Wichita, Kan., Williamsport, Pa., Worcester, Mass.

*Stocks of Oakite Materials are carried in these cities.

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Industrial Cleaning Materials and Methods

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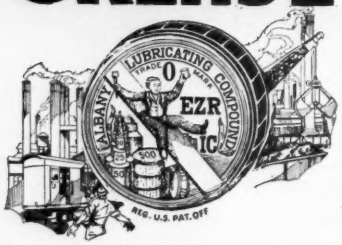

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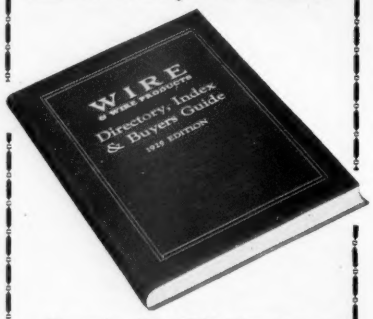


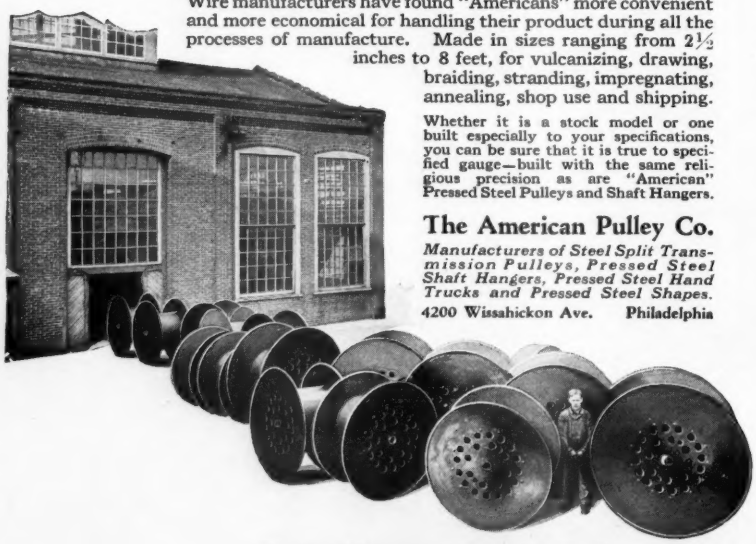
To make this 1929 Directory as complete as possible, names of manufacturers and their products are being assembled now for careful revision before publication three months hence. Your name will be listed without charge or obligation under the headings you indicate. Specify the kinds of wire, wire products, or will mill equipment and mail to:

WIRE & WIRE PRODUCTS
551 Fifth Ave.,
New York City, U. S. A.

Pressed Steel Reels that Come Back for More!

TONS of fractious, unwieldy cable require "American" Pressed Steel Reels. Practically indestructible and stronger. Wire manufacturers have found "Americans" more convenient and more economical for handling their product during all the processes of manufacture. Made in sizes ranging from 2½ inches to 8 feet, for vulcanizing, drawing, braiding, stranding, impregnating, annealing, shop use and shipping.

Whether it is a stock model or one built especially to your specifications, you can be sure that it is true to specified gauge—built with the same religious precision as are "American" Pressed Steel Pulleys and Shaft Hangers.



The American Pulley Co.
Manufacturers of Steel Split Transmission Pulleys, Pressed Steel Shaft Hangers, Pressed Steel Hand Trucks and Pressed Steel Shapes.
4200 Wissahickon Ave. Philadelphia

AMERICAN PRESSED STEEL REELS

The New Magnetic Tests of Wire

(*Continued from page 335*)

ed, short-circuiting the condenser, and the resulting deflection which carries the spot of light to 3 is the X reading, along its proper axis. The position of the spot of light may now be recorded by a pencil mark on the paper which constitutes the plot. The coordinate of this spot, x and y, are the measurements which it is desired to plot against each other, in their proper relation.

Another form of circuit which may be used to detect flaws is shown in Fig. 8. This circuit differs from the first circuit in that the galvanometer bridge circuit is a secondary circuit.

Varying the Circuits

The galvanometer field is still excited, however, from the main A. C. supply. The bridge is composed of secondary coils of two test coils in parallel with two resistances in series with the slider for the x and y circuits. The moving coil circuit is the same as in the previous circuit. The two test coils, windings are identical, and a standard or good sample is placed in one. The other test coil receives suspected samples or one sample in the form of a coil of wire may be drawn through at a uniform rate.

In the case of single specimens the procedure for the previous circuit may be followed out and the results plotted out on graph paper when it will be seen that samples group themselves into two distinct groups. In the case of a coil of wire, the circuit may be left on either the x or y circuit, the galvanometer showing any irregularity of structure or composition by an increase or decrease of deflection.

The uses and capabilities of the instrument are unlimited and by the use of suitable circuits elastic limits, yield points, and even composition may be determined.

Hardening Springs For Elasticity

(*Continued from page 339*)

per unit of load, and hence the added stiffness.

In the course of inspection of the physical properties of finished springs made of the proper deep hardening alloy steels of not over 3/8" in thickness, the hardness unit can be depended on as denoting the elastic power, but in steels that do not harden deep uniformly, the surface hardness should occasionally be supplemented by a bend test. If thus a single leaf or rod is bent and the distance of the points of cantilever support is six times that of its thickness such as were used in the preparation of the chart in Fig. 4, then the various bends shown in it may be taken as a reliable guide, indicating, as it were, the standard flexure to be expected at a given hardness permeating all through.

Uniform Hardness Imperative

Springs for locks, firearms, etc., which are of steel and have to be bent to shape after tempering are of a lower carbon (like piano wire) than those which are tempered after forming. If a carbon content of about 0.50 is selected, a spring will retain considerable toughness or capacity to take permanent settings at 70 hard. At 60 hard, there is already marked ductility, but at lower hardnesses the harder cold rolled or drawn metals do not only compete in elasticity, but they possess the advantage of being more easily cut as in punching, drilling, etc.

Coldworked metals are most commonly used when but limited elastic power is required and when it is desired to bend or form them in dies. In this field, practice has shown that after the proper temper has been selected it is imperative that the hardness thereafter be maintained uniform. Undue variations of hardness render the products of the dies correspondingly variable in configuration.

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The most improved metal composition die.

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Accurate Size Smooth Draw

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DETROIT
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ACCURATE
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Detroit Dies are an American product, guaranteed against breakage on "soft" metals for six months.

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Detroit, Michigan

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BELLET & BOUVARD

Manufacturers of

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WIRE GAUGES AND
FINE STEEL WIRE DIES

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Broden Construction Co.

Wire Mill and Cold Rolling Equipment

10255 Harvard Ave.
CLEVELAND, OHIO

Domestic Exports of Iron and Steel Wire, Wire Rope and Nails, From the United States, By Countries

July, 1928

Countries	Plain iron or steel wire	Galvanized wire	Barbed wire	Wire rope	Insulated iron or steel wire and cable	Wire nails
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
Belgium	.....	.....	.....	.....	.....	176
Finland	.....	.....	.....	5,815	.....	.....
Germany	49,995	.....	.....	.....	.....	.....
Lithuania	.....	.....	309	.....	.....	.....
Netherlands	122	.....	.....	.....	.....	.....
Norway	13,423	.....	.....	.....	508	.....
Portugal	2,171	.....	.....	.....	.....	.....
Rumania	.....	.....	.....	5,695	.....	.....
Soviet Russia in Europe	.....	.....	.....	750	23,895	.....
United Kingdom	168,508	.....	47,040	942	410	.....
Canada	1,127,541	1,319,310	350,861	53,210	7,066	13,910
British Honduras	.....	5,505	5,690	.....	.....	100
Costa Rica	.....	500	37,500	149	345	17,000
Guatemala	731	300	80,591	.....	.....	8,330
Honduras	1,088	864	84,500	2,698	.....	58,691
Nicaragua	.....	33,848	119,440	500	.....	63,550
Panama	4,113	220	44,925	93	.....	48,900
Salvador	.....	5,000	66,050	5,138	.....	2,675
Mexico	301,055	216,231	1,262,661	174,907	20,690	17,571
Miquelon & St. Pierre Is.	.....	.....	.....	.....	.....	1,300
Newfoundland & Labrador	240	.....	4,000	.....	140	.....
Bermudas	.....	845	.....	2,350	.....	.....
Jamaica	.....	9,851	83,720	2,556	5,233	17,790
Trinidad and Tobago	.....	.....	1,000	18,532	5,952	9,100
Other British W. Indies	200	.....	3,192	.....	2,545	3,342
Cuba	56,906	78,521	1,091,885	64,484	26,763	476,343
Dominican Republic	8,669	23,000	297,970	2,499	3,808	13,800
Netherland West Indies	2,866	666	30,000	6,319	.....	12,615
Haiti, Republic of	500	.....	11,500	81	.....	45,705
Virgin Islands of U. S.	.....	2,000	5,500	.....	216	5,600
Argentina	853,863	264,552	1,604,507	11,988	190	500
Bolivia	.....	3,020	2,000	.....	.....	8,503
Brazil	153,727	109,174	2,436,665	1,977	9,550	2,850
Chile	400	596	226,192	43,157	.....	8,850
Colombia	2,167	171,364	1,211,852	42,057	74,077	434,953
Ecuador	7,103	.....	.....	.....	.....	17,323
British Guiana	.....	.....	.....	1,060	.....	.....
Surinam	.....	600	.....	1,290	.....	.....
Paraguay	.....	.....	.....	.....	.....	441
Peru	6,700	12,000	116,543	100,290	.....	19,614
Uruguay	129,352	.....	26,455	4,048	.....	1,000
Venezuela	31	4,989	599,450	12,794	2,014	22,907
British India	.....	360	.....	25,870	.....	.....
British Malaya	.....	.....	.....	7,617	.....	.....
Ceylon	2,200	.....	.....	.....	.....	.....
China	5,696	331,462	4,235	54,728	84	946,550
Java and Madura	.....	30,000	134,221	14,114	.....	.....
Other Netherland E. Indies	.....	.....	73,419	59,044	.....	3,000
French Indo-China	.....	400	.....	.....	.....	.....
Hong Kong	.....	33,688	.....	.....	.....	.....
Japan	50,845	906,473	.....	17,921	.....	14,560
Philippine Islands	2,102	36,212	849,429	84,822	4,681	884,728
Siam	.....	.....	220	.....	.....	.....
Soviet Russia in Asia	.....	.....	.....	.....	.....	3,872
Turkey	.....	.....	.....	.....	.....	1,000
Australia	176,795	39,865	.....	24,472	.....	100
British Oceania	.....	.....	2,240	.....	.....	3,695
French Oceania	.....	.....	1,080	.....	.....	200
New Zealand	160,723	101,984	18,400	.....	.....	1,412
Belgian Congo	.....	.....	344	.....	.....	.....
Union of South Africa	60,500	140,000	141,950	2,795	.....	43
British West Africa	.....	1,325	.....	1,195	.....	.....
Egypt	.....	9,990	.....	.....	.....	.....
Mozambique	.....	67,200	.....	7,670	.....	.....
Total Quantity	3,350,333	3,961,915	11,077,536	865,627	188,167	3,191,599
Total Value	145,439	110,315	311,041	120,513	22,517	89,741

Shipments from the United States to Non-Contiguous Territories.

Alaska	.....	.....	.....	.....	.....	114,487
Hawaii	103,832	150,614	72,584	65,430	3,915	221,888
Porto Rico	7,519	37,106	387,925	9,188	338	427,735

July Exports Increase

IN addition to the foregoing detailed data on exports of iron and steel wire and wire products for the month of July, the Department of Commerce has supplied some interesting figures on exports of copper wire and electrical equipment.

July exports of bare copper wire amounted to $509,216, an increase of $382,849 compared with the corresponding month last year. Of this amount Germany took over 50 per cent. or $270,649 worth. Argentina, Canada and China were next in importance, these countries taking such material valued at

Domestic Exports of Iron and Steel, Wire Manufactures, Horseshoe Nails and Horseshoes From the United States, By Countries

July, 1928

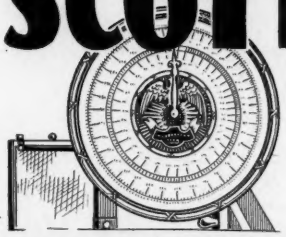
Countries	Woven wire fencing	Woven wire Screen Cloth		Wire n. e. s. & manufactures of	Horseshoe nails	Horseshoes
	Pounds	Pounds	Dollars	Pounds	Pounds	Pounds
Belgium	.....	.....	.....	201	.....	.....
Denmark	.....	.....	.....	1,110	.....	.....
Finland	.....	.....	.....	386	.....	.....
France	.....	.....	.....	3,681	.....	.....
Germany	.....	.....	.....	1,053	356	.....
Italy	.....	.....	.....	.....	11,660	.....
Lithuania	3,368	.....	.....	.....	.....	.....
Netherlands	.....	50	25	.....	7,828	.....
Norway	.....	.....	.....	3,973	.....	.....
Spain	.....	.....	.....	1,631	.....	.....
Sweden	.....	.....	.....	352	.....	.....
Switzerland	.....	.....	.....	377	.....	.....
United Kingdom	180,438	1,169	278	77,800	.....	.....
Canada	161,403	237,326	15,975	698,733	28	19,098
B. Honduras	190	.....	.....	14	.....	.....
Costa Rica	6,162	.....	.....	14,891	1,425	3,900
Guatemala	.....	.....	.....	487	300	.....
Honduras	15,948	2,766	600	482	.....	1,025
Nicaragua	1,523	.....	.....	5,281	.....	.....
Panama	15,553	157	28	6,965	.....	.....
Salvador	3,870	418	56	711	.....	.....
Mexico	158,583	33,493	6,021	256,054	9,815	3,433
Newfoundland & Labrador	2,612	1,260	164	679	.....	.....
Bermudas	600	233	64	446	300	1,000
Jamaica	.....	1,182	245	4,617	.....	.....
Trinidad & Tobago	3,142	2,503	414	69	.....	.....
Other B. W. Indies	440	465	57	.....	75	.....
Cuba	141,534	47,410	6,526	127,470	17,650	76,684
Dom. Republic	2,610	6,063	531	10,690	100	200
Netherland W. Indies	5,000	191	40	290	.....	.....
Haiti, Rep. of	19,468	400	66	4,197	100	.....
Virgin Islands of U. S.	800	166	32	.....	100	.....
Argentina	119,416	17,039	3,401	176,005	28,864	33,500
Bolivia	.....	2,203	324	.....	.....	.....
Brazil	5,964	2,537	316	64,210	9,000	.....
Chile	.....	11,009	1,485	56,891	16,716	.....
Colombia	28,809	16,332	2,195	4,178	42,000	.....
Ecuador	.....	.....	.....	902	3,000	.....
B. Guiana	.....	.....	.....	200	.....	.....
Peru	551	1,868	329	2,871	2,500	.....
Uruguay	.....	897	214	879	.....	.....
Venezuela	53,277	8,097	1,914	6,768	6,000	.....
B. India	33,286	3,172	519	143,160	1,200	.....
B. Malaya	935	1,025	312	.....	.....	.....
Ceylon	.....	.....	.....	532	.....	.....
China	88,269	7,057	1,804	106,394	980	.....
Java & Madura	22,048	.....	.....	612	.....	.....
Other Netherland E. Indies	.....	1,169	847	176,400	.....	.....
Iraq	.....	.....	.....	125,270	.....	.....
Japan	.....	270	65	201,632	10,500	.....
Philippine Is.	228,288	12,423	1,834	8,778	65,750	.....
Siam	4,200	1,000	77	.....	.....	.....
Turkey	.....	.....	.....	2,800	.....	.....
Australia	6,249	38,602	6,783	58,927	21,075	.....
B. Oceania	.....	600	56	270	.....	.....
F. Oceania	814	.....	.....	444	.....	.....
New Zealand	.....	2,749	474	4,659	15,436	.....
Belgian Congo	2,700	.....	.....	.....	.....	.....
B. E. Africa	.....	.....	.....	110	.....	.....
Union of So. Africa	7,448	15,501	3,376	9,409	.....	.....
Egypt	9,640	.....	.....	.....	.....	.....
Morocco	.....	4,632	840	.....	.....	.....
Mozambique	1,469	.....	.....	.....	.....	.....
Other S. Africa	1,330	.....	.....	.....	.....	.....
Total Quant.	1,336,610	483,434	.....	2,374,941	272,758	141,840
Total Value	75,033	.....	58,787	212,914	26,696	8,516
Shipments from U. S. to:						
Hawaii	43,987	19,218	3,359	7,819	587	4,040
Porto Rico	37,319	19,128	1,999	118,950	.....	35,480

$38,857, $37,719, and $32,629 respectively. Bare copper wire valued at $20,182 was shipped to the Netherlands during that month.

Foreign trade of the United States in electrical equipment during July continued to rise, exports amounting to $9,920,208, an increase of $1,459,484 compared with the corresponding period of last year. As compared with the January-July total for 1927, the 1928 exports are leading by $5,443,891.

The electrical equipment total is swelled considerably by increased foreign demand for electric refrigeration sets up to one ton capacity. Although Canada is the largest market for this commodity, other countries show gains, particularly Spain, Australia and Austria.

SCOTT



HORIZONTAL & VERTICAL TESTING MACHINES FOR WIRE

Give visible reading and graphic charts showing strength, stretch, elongation and action under stress. Used to establish standards governing purchasing and manufacturing.

HENRY L. SCOTT Co.
PROVIDENCE, R.I.

TESTERS

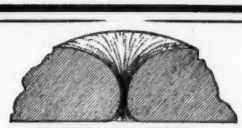
WIRE DRAWING DIAMOND DIES

Over 30 years experience in this line. The best equipped establishment in America with modern methods and machinery.

New way for re-inforcing the diamond.

(U. S. Patent 1,624,027. April 12, 1927.)
Tel. Webster 5105, Cable Address: Krauseco

F. KRAUSE & CO., Inc.
250-252-Ogden Ave.
JERSEY CITY, N. J.



WATCH THE SHAPE
COCHAUD
Wire Die Corporation

Wire Drawing Diamond Dies
300 West 56th St., New York
Tel. Columbus 10148

BAKERS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CLEANING COMPOUNDS
Oakite Products, Inc., N. Y.

CRANES
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

DIES—Chilled Iron
Waterbury Wire Die Co., Waterbury, Ct.

DIES—Diamond
Bellet & Bouvard, N. Y.
Cochaud Wire Die Co., New York.
Driver-Harris Co., Harrison, N. J.
F. Krause & Co., Inc., Jersey City, N. J.
Union Wire Die Corp., New York, N. Y.
Urdika Wire Die Co., N. Y. C.
Vianney Wire Die Works, New York.
Waterbury Wire Die Co., Waterbury, Ct.

DIES—Repairs & Re-Cutting
Bellet & Bouvard, N. Y.
Cochaud Wire Die Corp., New York.
F. Krause & Co., Inc., Jersey City, N. J.
Urdika Wire Die Co., N. Y. C.
Vianney Wire Die Wks., N. Y.

DRAWING COMPOUNDS
Oakite Products, Inc., N. Y.

FURNACES—Wire Annealing
Vaughn Machinery Co., Cuyahoga Falls, O.

GAUGES—Wire
A. Waldeck & Co., Cleveland, Ohio.

LATHES—Die Reaming
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

LOOMS—Wire Weaving
M. A. Irmischer, New York.
The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

LUBRICANTS—Wire Drawing
Adam Cook's Sons, Inc., New York City.

MACHINERY—Armoring (Cable, Wire, Hose)
J. I. Bernitz, New York.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling
J. I. Bernitz, New York.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson.

MACHINERY—Cutting
J. I. Bernitz, New York.
The F. B. Shuster Co., New Haven, Conn.

MACHINERY—Coiling
J. I. Bernitz, New York.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Chain Forming
J. I. Bernitz, New York.
M. A. Irmischer, New York.

MACHINERY—Electric Chain Welding
J. I. Bernitz, New York.
M. A. Irmischer, New York.

MACHINERY—Forming
J. I. Bernitz, New York.
M. A. Irmischer, New York.
Sleeper & Hartley, Inc., Worcester, Mass.
M. D. Kilmer & Co., Cleveland, Ohio.

MACHINERY—Gem Clip
J. I. Bernitz, New York.
M. A. Irmischer.

MACHINERY—Insulating
American Insulating Machinery Co., Phila.
New England Butt Co., Providence, R. I.

MACHINERY—Nail
J. I. Bernitz, New York.
M. A. Irmischer, New York.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Pointing
M. A. Irmischer, New York.
Morgan Construction Co., Worcester, Mass.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
The Waterbury Farrell Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Pin & Needle
J. I. Bernitz, New York.
M. A. Irmischer, New York.

MACHINERY—Screw Wire
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Second-hand
Jesse Atherton, Providence, R. I.

MACHINERY—Spring Making
J. I. Bernitz, New York.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Staple
J. I. Bernitz, New York.
Sleeper & Hartley, Inc., Worcester, Mass.
M. A. Irmischer, New York.

MACHINERY—Straightening
J. I. Bernitz, New York.
Sleeper & Hartley, Inc., Worcester, Mass.
M. A. Irmischer, New York.
F. B. Shuster Co., New Haven, Conn.

MACHINERY—Stranding
J. I. Bernitz, New York.
M. A. Irmischer, New York.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Machinery Co., Phila.
M. A. Irmischer, New York.
The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Panning
American Insulating Machinery Co., Phila.

MACHINERY—Testing
Henry L. Scott Co., Providence, R. I.

MACHINERY—Trolley Wire
The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Winding
J. I. Bernitz, New York.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Drawing
American Insulating Machinery Co., Phila.
Broden Const. Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
M. A. Irmischer, New York.
E. J. Scudder Foundry & Machine Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

NEUTRALIZING COMPOUNDS
Oakite Products, Inc., N. Y.

PATENTS
Lancaster & Allwine, Washington, D. C.

REELS—Annealing
American Pulley Co., Philadelphia, Pa.
Apco-Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

PRESSES—Rivet & Bolt
M. A. Irmischer, New York.

SOAPS—Wire Drawing
R. H. Miller Co., Homer, N. Y.

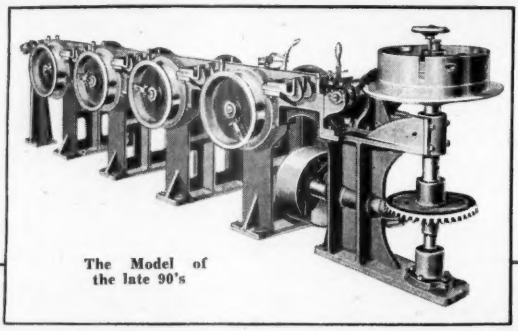
SPOOLS—Wire & Cable
American Pulley Co., Philadelphia, Pa.
Apco-Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TRUCKS
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

WATERBURY-FARREL TANDEMS

Three Decades Perfecting Continuous Wire Drawing Machines

WE THOUGHT THE OLD MACHINES WERE PRETTY GOOD IN THE OLD DAYS (AND THEY WERE) BUT TIMES HAVE CHANGED. TODAY WE OFFER NOT A BETTER METHOD NOR A NEW PRINCIPLE, BUT—



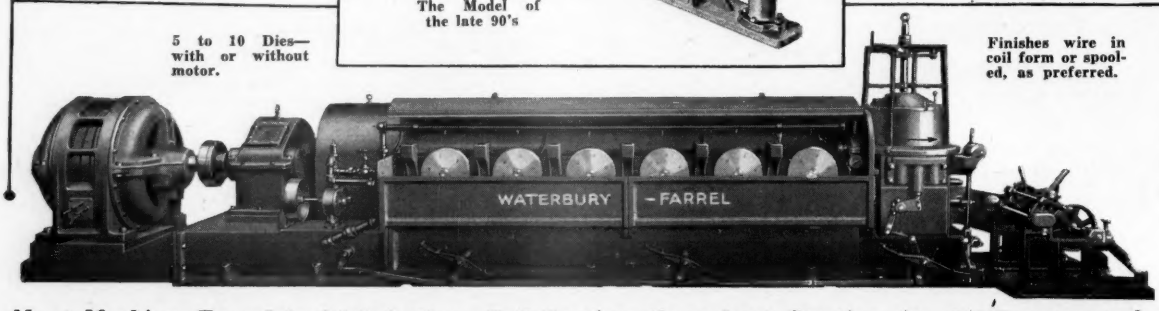
The Model of the late 90's

A FAR BETTER MACHINE THAT MEETS IN ELOQUENT FASHION EVERY DEMAND OF THE PRESENT DAY—

HIGH SPEED
LOW OPERATING COST
MECHANICAL EFFICIENCY

5 to 10 Dies—with or without motor.

Finishes wire in coil form or spooled, as preferred.



No. 1 Machine. Forced feed lubrication. Ball Bearings throughout. Starting size, 5/16" copper rod.

THE WATERBURY FARREL FOUNDRY AND MACHINE COMPANY

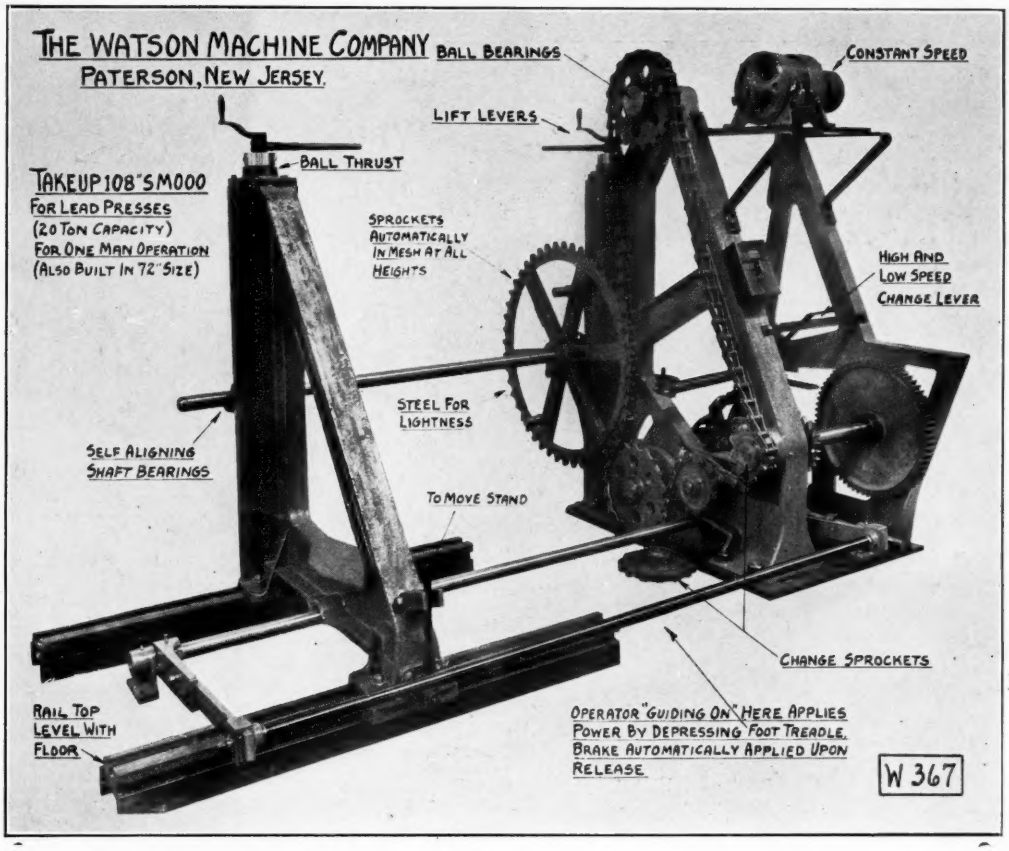
HOME OFFICE AND WORKS: 453 BANK STREET, WATERBURY, CONNECTICUT
WESTERN SALES OFFICE: 1016 WILLIAMSON BUILDING, CLEVELAND, OHIO

THE WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

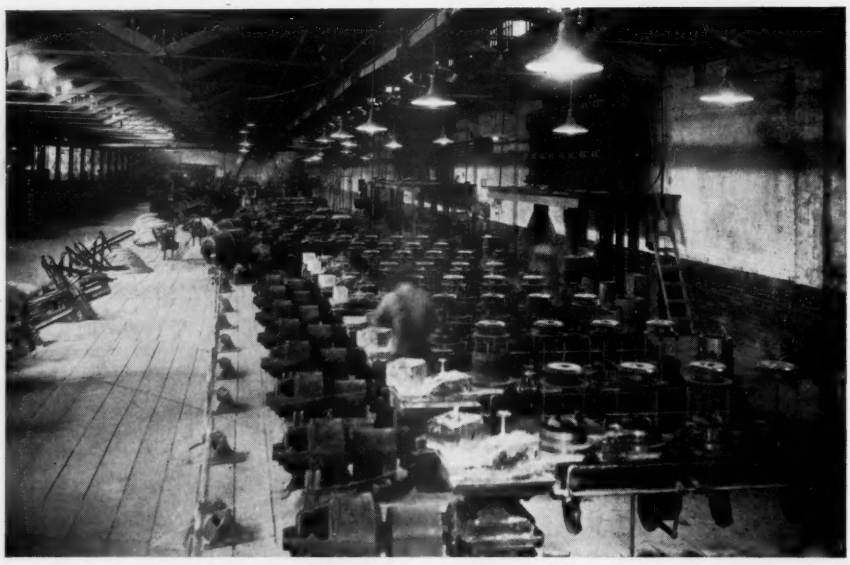
ENGINEERS - FOUNDERS - MACHINISTS


THE WATSON MACHINE COMPANY
PATERSON, NEW JERSEY.
BALL BEARINGS
CONSTANT SPEED
LIFT LEVERS
BALL THRUST
TAKEUP 108"SM000
FOR LEAD PRESSES
(20 TON CAPACITY)
FOR ONE MAN OPERATION
(ALSO BUILT IN 72" SIZE)
SPROCKETS AUTOMATICALLY IN MESH AT ALL HEIGHTS
HIGH AND LOW SPEED CHANGE LEVER
STEEL FOR LIGHTNESS
SELF ALIGNING SHAFT BEARINGS
TO MOVE STAND
CHANGE SPROCKETS
RAIL TOP LEVEL WITH FLOOR
OPERATOR "GUIDING ON" HERE APPLIES POWER BY DEPRESSING FOOT TREADLE. BRAKE AUTOMATICALLY APPLIED UPON RELEASE
W 367

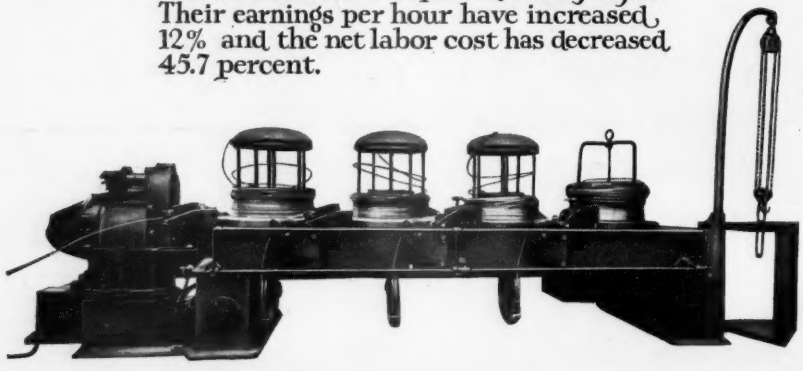
FOR "ONE-MAN" OPERATION OF REEL AT LEAD PRESSES

ELECTRICAL WIRE AND CABLE
WIRE ROPE and CORDAGE MACHINERY

MORGAN
WORCESTER
ENGINEERS AND MANUFACTURERS



Through this installation of
Morgan Connor Wire Machines
twelve men have replaced *twenty-eight.*
Their earnings per hour have increased
12% and the net labor cost has decreased
45.7 percent.



MORGAN CONSTRUCTION CO.
WORCESTER, MASSACHUSETTS, U.S.A.